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A Converter Foundry of Large Capacity

Intensive Production Methods of the Reading Steel Casting Company—Time and Labor Saving Devices—Copper Bearing Steel a Feature

(With Supplement)

BY EDWIN F. CONE

Progressive practice spells success in the manufacture of small steel castings. The demand for these grows rapidly. New plants and new processes are not infrequent but real success does not always follow. Efficiency and economy in molding, maximum metal output insuring low cost, up-to-date heat treatment and finishing, with devices for saving time and labor are indispensable. Progressive ideas are even more necessary in this field than in that of the producer of large steel castings. The plant of the Reading Steel Casting Company, Reading, Pa., is a typical illustration of the above statements.

The Melting Department of the Reading Steel Casting Company, Consisting of Four Converters, One Large Cupola, One Small Cupola, One Heating Arrangement for Cupola Ladle and a Small Cupola for Melting Final Additions. The converters are operated in batteries of two, one blown while the other is emptied

Commencing in 1906 with a small foundry, formerly the Brylgon Steel Casting Company, having but one converter, the present management has seen the plant grow to four times its former size in melting capacity and eight times in floor space and sales. Though the new construction has been gradually added to the old, the necessity for an orderly progression in foundry manipulation has not been lost sight of. The result is a unit insuring fairly satisfactory conditions as compared with the possibilities of an entirely new plant. With an output of 600 tons of finished castings per month, averaging 30 lb. to the casting, and a possible production of 700 tons, this plant, with its four 2-ton converters, can equal the tonnage output of some of the smaller open-hearth foundries.

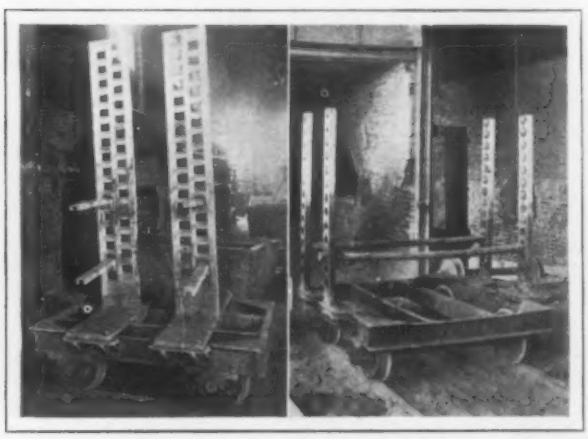
Three features are prominent in this foundry, the molding facilities, the production and manipulation of the steel and the heat treatment and finishing of the castings.

MOLDING AND POURING

Small Castings.—Very small castings, made in large quantities daily, are the chief work of such a foundry. In the average small foundry many of these are made in snap flasks, in which they remain until poured. This involves the provision and handling of hundreds of such flasks. The Reading Steel Casting Company approaches this problem

uniquely. The efficiency and progressiveness of the molding machine were at once recognized. In a large space devoted solely to this class of work, on a concrete covered floor provided throughout the plant, a battery of molding machines and some bench molders turn out hundreds of molds in snap flasks. Instead of leaving the finished mold in its flask, each one, removed from the flask, is placed upon a rack carrying several molds on steel plates. By means of a monorail crane system, serving this department, each rack of snap molds is transported to specially constructed oven cars, the crane, the racks and the loaded cars being shown in some of the illustrations. These cars are of two types and are designed by the company.

Thorough drying of these small molds in two ovens is a feature, thus eliminating the uncertainty resulting from the pouring of such castings in green sand. The molds are then bedded in on the dry floor in front of the ovens where they are poured and knocked out. One of the illustrations shows this snap dry floor after the heat has been cast. This method of molding, drying and casting the small work on so large a scale is believed to be a feature not found in other similar foundries.



The Latest Style of Drying Oven Car for Snap Molds (Left) and the Method of Stacking the Molds. Original style of oven car for snap molds (right) which permits the loading of very wide molds. A few cars of this type are still in use

Larger Castings.—As shown by the plan of the plant in the accompanying Supplement there is a larger molding floor of concrete, 68 ft. x 240 ft., which is served by two 10-ton Shepard traveling cranes and which has two drying ovens of a capacity of ten cars each. Each oven has two tracks and each track carries five cars, a total of 20 cars capacity. It has one jolt molding machine with a capacity of 5000 lb., served by an electric jib crane. Six pneumatic sand rammers are also a part of the equipment. Here the larger castings are molded and prepared with the usual flask equipment.

The core department, located conveniently at one side of the main dry floor in a bay, has a unique continuous core oven, there being only one other like it in operation. The illustration of this department shows this oven. It contains 48 sliding compartments, each one of which can be opened independently for the placing in or removing of cores without interrupting the drying of other cores. It is fired over a pit with coke and hard coal and is operated continuously. The jolt molding, sand-mixing and wash-mixing machines are also visible.

THE MELTING DEPARTMENT

To operate at 100 per cent capacity 100 per cent of the time is the desideratum in converter steel foundry practice. With the equipment and

Snap Molds Made On a Squeeze Molding Machine Loaded on Racks Ready for Drying Ovens. Facing sand in cast steel tubs at the right ready for the snap molders

facilities described, the company can pour 1400 tons of finished steel per month. Allowing an average yield of 50 per cent, 700 tons of finished castings is the possible output. This means blowing and pouring 54 tons per day in a month of 26 working days, nearly the equal of an open-hearth foundry having one 20-ton furnace. All this metal, however, is produced and poured in from six to seven hours in the day time, no night shift being employed.

The equipment consists of four 2-ton converters, originally of the Tropenas type, but so altered and improved that the company considers them its own design. Besides the converters there is one large Paxson cupola as well as a smaller one of the same make, at the opposite end of the row, for pre-melting the additions of ferrosilicon, ferromanganese, etc. One of the illustrations shows the four converters, the cupola and the oil heating arrangement for the cupola ladle. The converters are operated in batteries of two, one being blown while the metal is removed from the other; a third converter is in the meantime being repaired. Every 20 minutes, 5000 lb. of metal can be poured into molds and as a consequence no time is lost as to small castings. Bottom-pour ladles are the rule, over 92 per cent of the castings being poured this way. This is considered a distinguishing mark of the foundry practice of this company as compared with the frequent use of small hand ladles. Each ladle is pre-heated with oil at a heating stand at the stone pier between the first two converters.

A convenient and time-saving method of handling the ladles just after pouring consists in a small car, made of a ring, mounted on low wheels, on which the ladle is placed by the large crane after pouring. It is then easily rolled to a cleaning floor for proper treatment in preparation for a

Method of Mounting Swing Grinders on Wheels So That They Can Be Operated in Practically Any Part of the Shop

new heat, eliminating further crane handling. The slag produced is sold in car loads to a blast furnace plant.

Use of Spiegeleisen.—No heats are made without recarburization, etc., with pre-melted alloys, except special ones for electrical purposes or those specified under 0.10 per cent carbon, without manganese or silicon. These are taken from the converters as blown, to which is added enough aluminum to remove oxides and insure solid metal. A small cupola is used solely for pre-melting. Here proper amounts of ferrosilicon, pig iron and ferromanganese are melted together, tapped into a small ladle and poured into the finished blown steel in the converter. Since the threatened scarcity and high price of ferromanganese, the use of high-grade spiegeleisen as a substitute has been inaugurated with marked success. This is melted with ferrosilicon, furnishing not only the necessary manganese but also the carbon usually obtained from the pig iron.

This Core Room Has a Continuous Oven Containing Forty-eight Sliding Compartments. It is fired over a pit and operated continuously. The jolt-molding, sand-mixing and wash-mixing machines are in the center background

COPPER BEARING STEEL CASTINGS

An unusual metallurgical feature characterizes the use of the pig iron. Steel scrap up to 50 to 60 per cent of the charge is used together with high grade coke and Robesonia low-phosphorus, high-silicon pig iron. It contains about 1 per cent of copper and so do the castings made from it. It has been believed, and is still in many quarters, that over 0.25 to 0.50 per cent of copper in castings is a decided detriment to their physical and other properties—especially where the sulphur content is high. The Reading Steel Casting Company has found that with a content of 1 per cent copper and the sulphur ranging from 0.045 to 0.060 per cent, physical results after proper heat treatment are obtained which equal and surpass those from many open-hearth and other steels free, or nearly free, from copper and lower in sulphur. The physical results of some of this steel are given in another part of this article. A metallurgical theory has evidently been proved a fallacy.

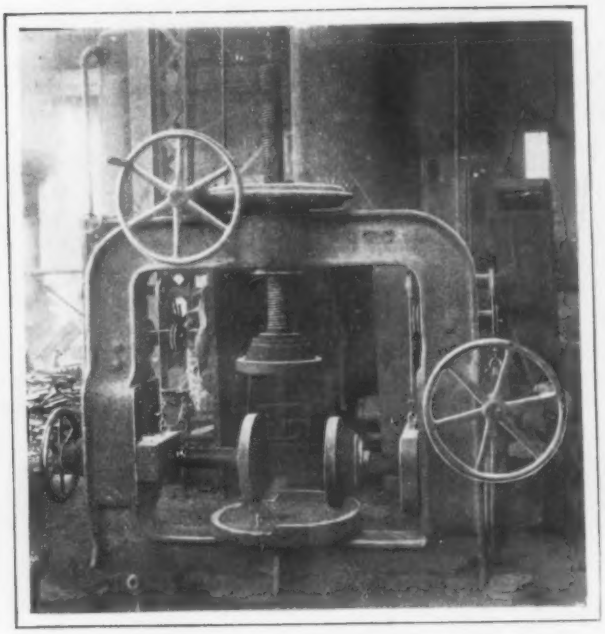
HEAT TREATING AND FINISHING

Heat Treatment.—Of prime importance in these progressive times is a proper annealing of steel castings, large or small, but especially small ones. Small steel castings cannot be too good and a proper heat treatment cannot fail to add to their strength and durability in service. Without question, where the shape and class of casting will permit it, quick cooling from just above the recalescence point will produce the best physical results and the toughest metal. The continuous annealer, into which a car of green castings can be pushed as one with treated castings is pulled out into the air, insures this heat treatment.

Two annealers make up the heat-treating department at Reading. One is a small annealer for small castings or special heats. It is oil-fired and equipped with two cars, insuring continuous operation. The other is a larger one, coal-fired, also equipped with two cars for continuous operation. It is open at both ends so that castings go through the furnace from one department to the other.

Physical Properties.—The table of physical tests on the next page is evidence of the effectiveness of the heat treatment.

The elastic ratio and ductility are noteworthy. The product of this foundry is plain carbon steels except for the copper content of practically 1 per cent. They range in carbon from 0.25 to 0.33, in manganese from 0.50 to 0.75, in silicon from 0.25 to 0.30, in sulphur from 0.045 to 0.060 and in phosphorus from 0.035 to 0.045 per cent. That the presence of copper accounts at least in part for the superiority of the static qualities is claimed by the



This Valve Testing Machine Was Specially Designed by the Company for the Hydraulic Testing of Valves in the Rough and is Believed to be the Only Machine of Its Kind in Existence

Table of Physical Tests of Annealed Converter Steel Castings Made by the Reading Steel Casting Company

Tensile Strength, Lb. Per Sq. In.	Elastic Limit, Lb. Per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Fracture	Elastic Ratio, Per Cent
68,900	39,500	33.0	52.1	½ cup	57.3
70,700	45,000	33.0	55.0	½ cup	63.6
71,000	44,500	33.0	55.0	cup	62.6
70,200	43,350	34.0	54.7	cup	61.7
69,800	42,750	34.0	54.7	cup	61.2
71,900	44,000	34.0	54.1	½ cup	61.1
72,000	44,000	33.0	54.4	cup	62.5
68,500	40,000	33.0	53.3	½ cup	58.3
71,500	43,500	33.5	53.3	cup	60.8
70,000	41,100	35.0	53.3	½ cup	58.7
70,500	42,000	32.0	53.3	cup	59.6
70,250	43,050	35.0	54.7	½ cup	61.2

management which states that a trial on an extensive scale of non-copper bearing pig iron resulted in satisfactory evidence of the beneficial effect of the copper.

Two other factors, however, enter into this question: 1. The method of casting test bars. 2. The method of heat treatment. The test bars, about 1 in. x 1 in., are cast on the bottom of a solid block of steel, 2 in. thick. This insures solid, dense metal and a speed of cooling resulting in an initial structure free from ingotism, which always produces the best physical results under proper heat treatment. This is also true of most of the castings, which are of more or less thin section, quickly cooled in the sand. The process of annealing speaks for itself.

Further evidence, however, is furnished by the reproduced photomicrographs showing the structure of the fractured piece from the second test in the table of physical results. The fineness and uniformity of the grain and the low carbon content are evident.

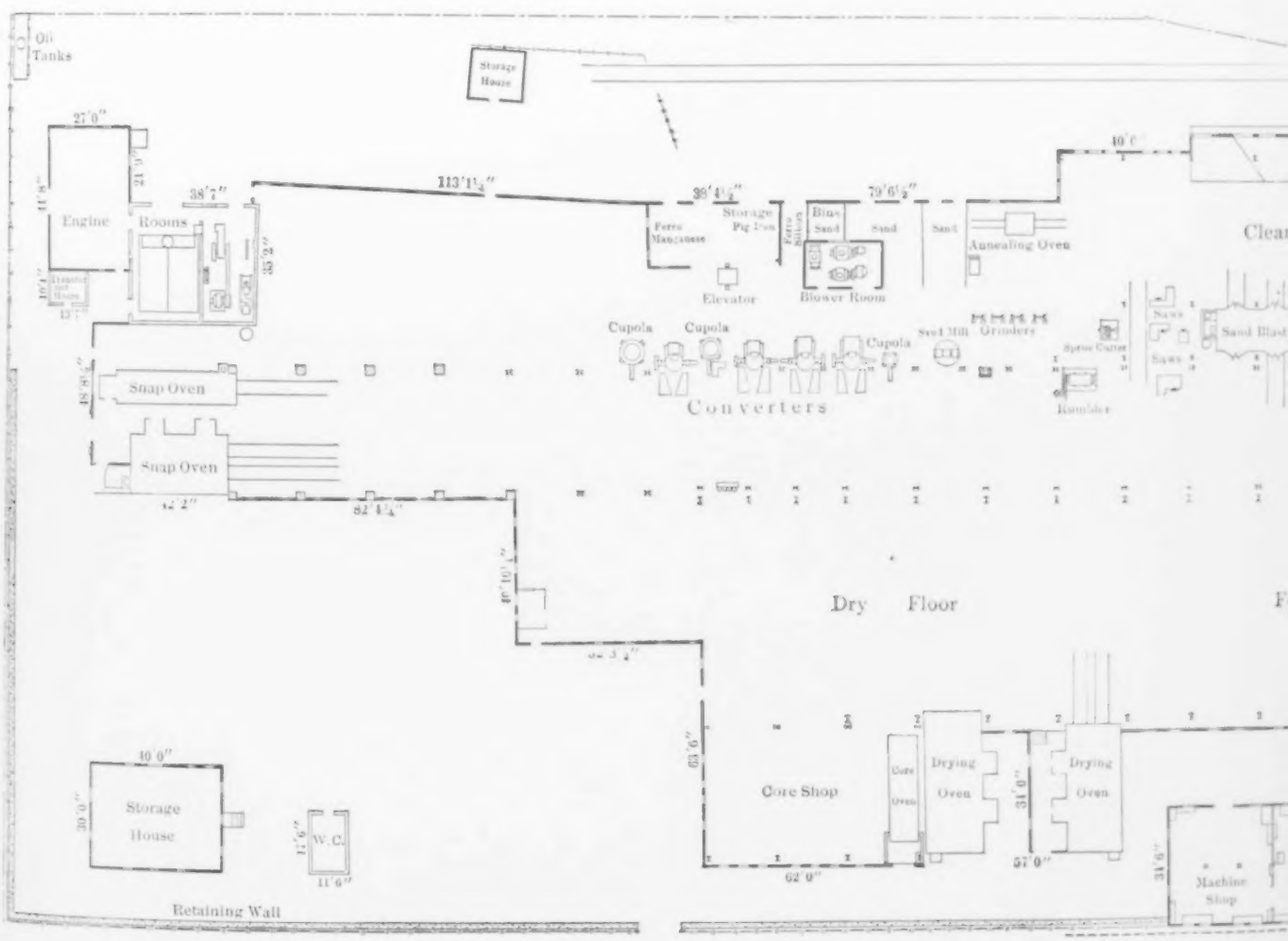
Finishing the Castings.—The claim is made that more money is spent on the annealing and finishing of the castings than on the molding. All castings are annealed unless the company is instructed to the contrary. They are sand blasted or rumbled in rumblers. An illustration shows the equipment for sand blasting consisting of two machines with a pit, a dust arrester, sand elevating apparatus and sand storage above the machines with a capacity of three cars of sand. While the cleaning department has three cold sawing off machines, use of these is abandoned wherever possible. A large sprue cutter or the oxy-acetylene torch removes most of the small gates, heads and sprues.

For taking off lumps or rough spots a mounted swing grinder, designed by the company, is particularly efficient. An illustration shows the method of mounting these grinders on wheels so that they

The Sand Blast Equipment Consisting of Two Machines with Pit, Dust Arrester, Sand Elevating Apparatus and Sand Storage Above the Machines with a Capacity of Three Cars of Sand

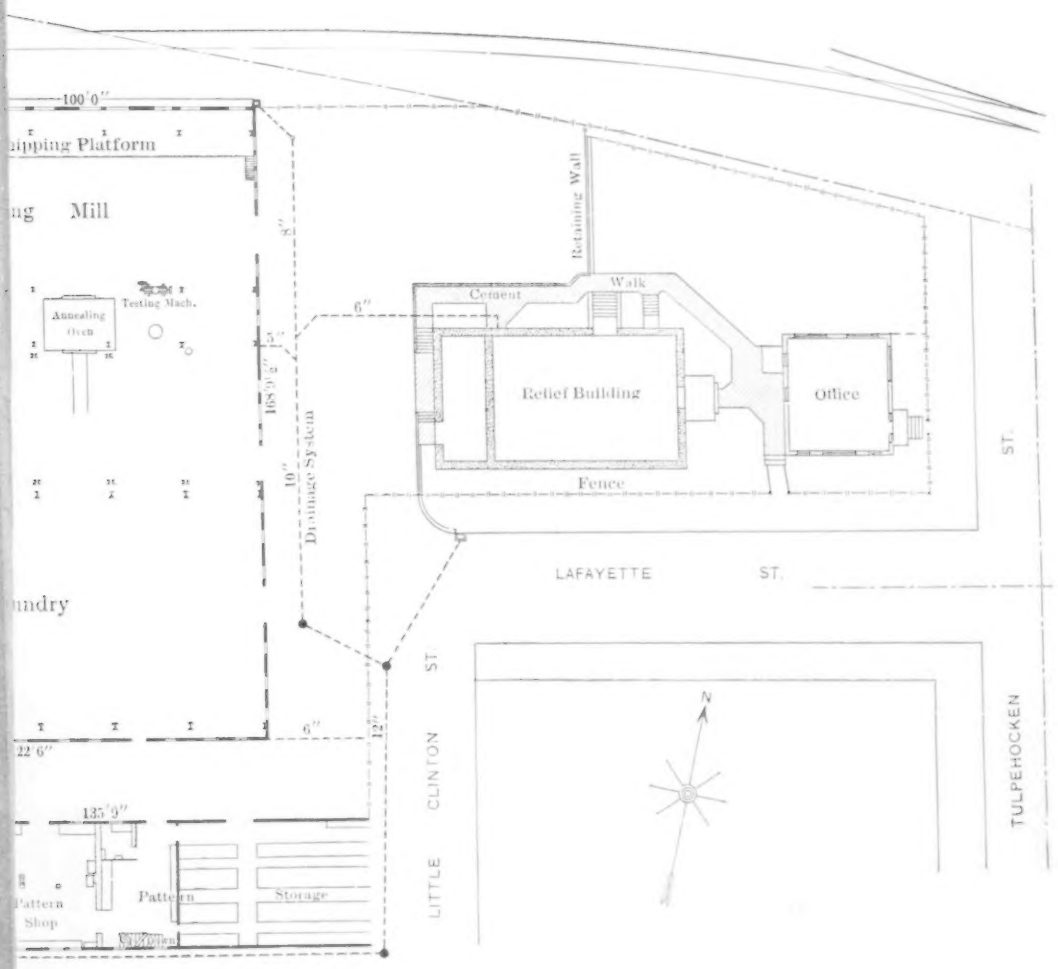
Corner of the Snap Molding Department Served by Four Two-Motor Monorail Cranes Which Pick Up the Molds on Racks and Load Them in the Drying Ovens. They Deliver Sand, etc., to the Molders

The Snap Dry



General Plan of the Plant of the Reading Steel C

Floor After the Heat Has Been Cast. In the Rear Are the Drying Ovens for the Snap Molds and the Special Cars. At the Right Background is the Snap Molding Department



sting Company, Reading, Pa.

mall Annealer for Small Castings or Special Heats Oil-Fired
nd Equipped with Two Cars, Making Continuous Annealing
ossible. Some of the many and varied castings are shown

The Large Coal-Fired Annealer Equipped with Two Cars for Continuous Operation. It is open at both ends allowing castings to go from one department to the other

an be operated in practically any part of the shop. There are also five stationary grinders carrying wo 20-in. diameter wheels.

While the company's output is all classes of mall carbon castings for the general jobbing trade, specialty is made of valves and fittings for superheated steam. To test these the company has a achine which is its own design, shown in an illustration. Facilities for shipping are such that three rs can be loaded at once from a platform or sent truck from the same point.

THE POWER PLANT AND OTHER BUILDINGS

The power used is entirely electric, purchased om the Metropolitan Electric Company at a guaranteed consumption per year. The power plant onsists of:

One 150-kw. motor generator set consisting of a 300-volt, 3-phase, 60-cycle motor and a 220-volt direct-urrent generator.

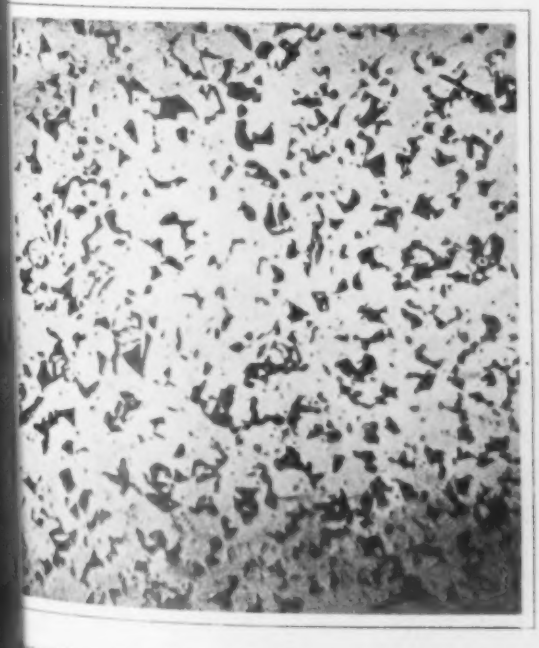
One compressor of 350 cu. ft. capacity of free air er min. at 80 lb. pressure.

One compressor of 980 cu. ft. of free air per min. at 80 lb. pressure.

One fuel oil pump which maintains uniform fuel oil pressure on the service lines throughout the shop pumping the oil from storage tanks in the yard.

The motor generator set furnishes current for the five 10-ton, the one $3\frac{1}{2}$-ton and the 2-ton traveling cranes and operates the converters. Alternating current supplies all other power used in the plant.

Separate buildings are devoted to the pattern and repair shop and to the store room and laboratory. In the matter of supplies, as in other departments, the principle of scientific management prevails. It is a rule that not the smallest article, needed at any one time shall be lacking when wanted so that "100 per cent operation 100 per cent of the time" can be approximated. The store room is built on a hill side so that heavy material can be loaded into the lower floor while the main entrance is into the second story. In this building, on the upper floor, the chemical laboratory consumes part



icrographs (Left) is from Tensile Test No. 2 in the Table. It represents a piece etched in picric acid and magnified diameters. The even and fine distribution of the ferrite and pearlite indicates the character of the annealing. The micrograph on the right is a magnification, ×500, of a portion of the other. The condition of the carbide or pearlite indicates the method of quick cooling. One or two globules of manganese sulphide are clearly visible

of the space. The building devoted to patterns is in two parts, the space for pattern storage being separated from the repair pattern shop by a brick fire wall.

While evidences of the results of scientific management are not lacking, the matter of safety is not overlooked, nor is the welfare of the employees. Probably no steel foundry in the United States is equipped with so complete and modern a welfare building, devoted to the relief association of the company, as that of the Reading Steel Casting Company, described in THE IRON AGE of Sept. 2, 1915.

Pneumatic Drop Machine for the Foundry

Machine for Making Drop Tests on Chilled Car Wheels—Designed and Built at the Lenoir Car Works for the Wheel Foundry

BY G. S. EVANS *

Compressed air is generally used for some purpose now-a-days at practically all foundries. Among its many uses, one which is not so general but which is nevertheless fast coming into prominence, is that of operating drop machines both for breaking up materials, such as heavy scrap, chilled carwheels, etc., and for drop testing machines, both heavy and light.

Among the advantages of this type of drop machine are its rapidity of action and simplicity of construction with low initial cost and up-keep. Another important feature is that it may be installed at the most convenient point for handling the particular work to which the machine is adapted without the necessity of a special power station.

*Superintendent of foundry, Lenoir Car Works, Lenoir City, Tenn.

Figs. 1, 2 and 3 show a drop testing machine especially designed for making the Master Car Builders' drop test on 33-in. chilled carwheels, which is as follows: The wheels are placed flange downward on an anvil block having three supports for the wheel to rest upon and is struck centrally on the hub by a 200-lb. weight, falling from a height of 9, 10 and 12 ft., for the 625, 675 and 725-lb. wheels respectively. Fig. 1 shows a front view of the drop with a wheel in position for testing and with the weight held at rest between the guide rails. Fig. 2 shows a side view with the guide rails deflected for removing the wheel after it has been tested. Fig. 3 shows the test weight resting on the test wheel and the grab rigging as it is engaging the weight to be lifted.

The supporting frame is built practically from

Fig. 1

Fig. 2

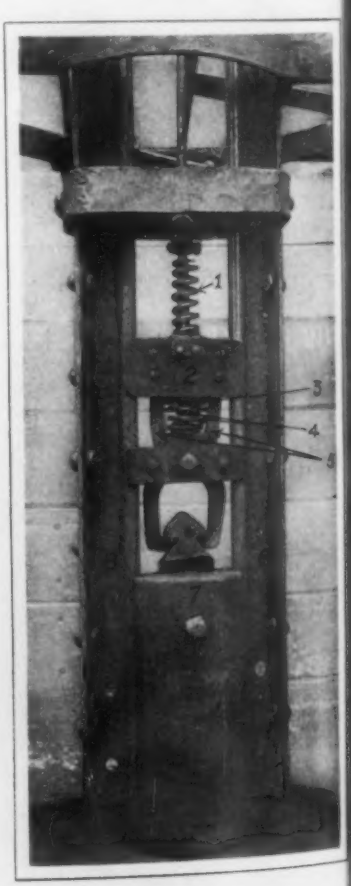


Fig. 3

MACHINE FOR TESTING WHEELS AT LENOIR CAR WORKS

At 1, Fig. 1, is the trip for releasing the weight; at 2 is one of steel bands for holding guide rails together. Fig. 2 shows how the guide rails are deflected to handle the wheel under test. In Fig. 3, 1 is the safety spring; 2, the tripping guide; 3, the tripping block; 4, the tripping spring; 5, the grab hook; 6, the grab head; 7, the test weight; 8, the guides.

scrap pieces of structural steel left over from car underframes, etc. The upright pieces or sides are made by riveting two 4-in. angles to 8-in. plates with side braces of 4-in. angles, all being tied together at the base by riveting to a 10-in. plate, as shown. The cross support is made from two 6-in. channels with tie braces of 6-in. plates, all of which makes the frame sufficiently rigid for the purpose. The guide rails are made from two 56-lb. rails each riveted to a 6-in. plate and are held together by steel bands, as shown at 2 in Fig. 1. These are made large enough for the weight to pass through without striking the sides.

The upper part of the guide rails forms a support for the air cylinder, which is made from a 4-in. boiler tube equipped with an ordinary cup leather piston head and a ¾-in. cold-rolled steel piston rod. The two cylinder heads are made of cast iron and threaded upon the tube. The stroke is 13 ft. and the lifting capacity is 1000 lb. with 80 lb. air pressure or approximately five times the load to be lifted. Consequently the weight is lifted rapidly. The intake is placed in the lower head and the weight of the piston rod and grab rigging serves to exhaust the spent air. The valve is of the three-way type and is placed near the ground convenient to the operator.

The stop or trip shown at 1 in Fig. 1 serves to trip the weight and is arranged so that it can be readily raised or lowered to suit the different weight wheels to be tested. The whole is supported at its center, on the cross support of the frame, pivoted so that it can be deflected to remove the test wheel.

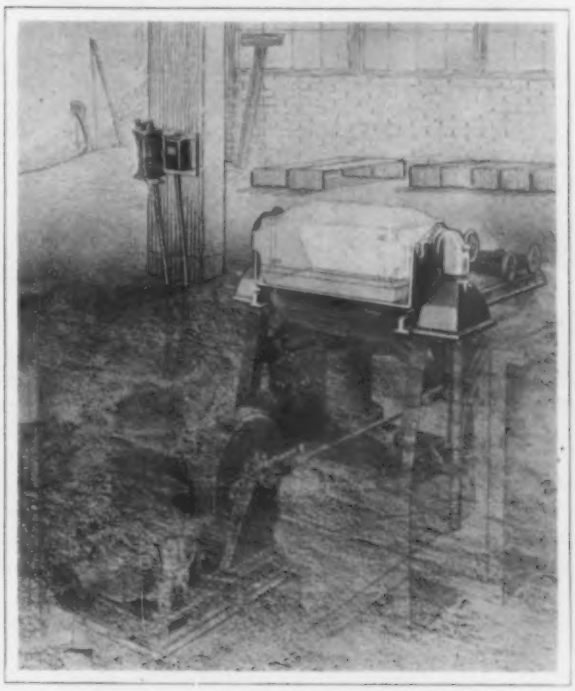
Fig. 3 shows the grab rigging and test weight, in which 1 is a safety spring arranged to take up the shock when the grab falls to the test weight; 2 the tripping guide which when it comes into contact with the tripping stop, shown at 1 in Fig. 1, compresses the tripping springs 4 and spreads the grabs 5 by means of the V-shaped tripping block 3, which is fastened to the tripping guides 2, and releases the weight. The exhaust valve is then opened and the grab falls to the test weight, the grab hooks are parted by the V-shaped grab head 6. These are made bottom heavy so that the two hooks will close together when hanging loose and as they are lifted, close into the notches of the grab head and lift the weight. The test weight is made of cast iron which is cored out to receive the grab head; this is made of a steel forging and rests upon a piece of wood which is inserted in the core to absorb the shock of the grab head when the weight strikes the test wheel.

With this type of drop machine, it is possible to strike from ten to fifteen blows per minute, which is some three or four times greater than is possible with the drum type and although the power consumption may be slightly greater than with the latter, the many advantages overbalance several times the loss in power, making it an economical machine and especially so where time is a consideration.

A branch office of the T. R. Almond Mfg. Company, Ashburnham, Mass., has been established at 1257 David Whitney Building, Detroit, Mich., from which point Don F. Kennedy, who has been appointed Michigan representative, will take care of the business in Michigan, which consists chiefly of flexible steel tubing for use on automobiles and motor trucks, and the Almond line of drill chucks. This action has been made necessary by rapidly increasing business among the automobile trade. Mr. Kennedy will also handle the business of the Sawyer Tool Mfg. Company, which is under the same management as the Almond Company, on its line of machinists' fine tools.

Electrically Operated Jolt Roll-Over Molding Machine

One of the interesting machines that will be shown at the exhibition in connection with the annual meeting of the American Foundrymen's Association at Atlantic City will be an electrically operated molding machine that has been brought out by the Osborn Mfg. Company, Cleveland, Ohio. The



New Osborn Molding Machine

new machine, aside from the method of operation, is the company's standard direct-draw roll-over molding machine and it is entirely operated by electricity with the exception of the sand shoveling.

The machine has two motors with a controller within easy reach of the operator. One motor jolts and the other rolls over the mold and draws the pattern. The motors are set on a base separate from the machine so that they are free from vibration. Two important features in connection with the motors are that they are entirely inclosed to exclude dust and dirt and they run only when the machine is in operation.

When the table is rolled over it is caught by a simple locking device designed to hold it in accurate alignment. The mold is then lowered upon the receiving car and after unclamping the pattern is drawn. The receiving car is equipped with the Osborn leveling device, which adjusts itself to any unevenness of the bottom boards. The pattern draw can be fast or slow or varied to suit conditions. After the pattern is drawn the receiving car is drawn clear of the machine, from which the mold can be removed when convenient, without interfering with setting flasks, filling or jarring the next mold. Working parts move in a bath of oil.

It is claimed that the electrical equipment soon pays for itself as its up-keep and running expenses are less than those of air operated machines. The machines are adapted particularly for use in plants where there is no air or where the air capacity is overtaxed.

A gold medal has been awarded the Dreis & Krump Mfg. Company, Chicago, by the Panama-Pacific International Exposition for its Chicago steel bending brakes.

Old and New Methods of Making Carwheels

The Metallurgical Superiority of the Air-Furnace Over the Cupola Method—High Sulphur in Chilled Iron Wheels—The Nitrogen Question

BY CHARLES V. SLOCUM*

More than thirty years ago the Washburn double plate wheel, so called, became the standard in this country. A few years later one of the railroads specified the drop test and later still the thermal test. These are well known and all the larger railroads now use one or both of these methods of ascertaining the power of the metal to resist strain. These tests were a step in the right direction and necessitated immediate improvement in metal and in methods of carwheel manufacture.

There was a time when not infrequently a wheel would break of its own weight or brittleness when merely dropped upon the anvil block preparatory to testing. The required tests, more especially the thermal tests, promptly necessitated the use of better grades of iron and a better product was the result. To increase the manganese became a necessity also, notwithstanding the fact that large additions of this element are objectionable. Manganese is known to remove sulphur and coke is known to add sulphur. Manganese makes the grain of the metal larger and sulphur tends to offset this by making it smaller, so the carwheel practice of to-day still is to increase the manganese for the purpose of obtaining additional strength with which to pass the tests and of retaining a large percentage of sulphur in order to keep the crystals or molecules small and uniform and at the same time to induce a harder tendency in the metal for the sake of the additional wear.

THE PREVALENCE OF HIGH SULPHUR

It is unnecessary to dwell upon the dangers of such a practice. The sulphur content of the iron wheels made to-day is often far in excess of the percentage permitted in steel, although the latter is a much stronger metal. It often happens that those who make the chilled iron wheel have never operated a laboratory in connection with their daily operations and even when they obtain determinations in the laboratories of others they do not decide to root out the evils which the ascertained results seem to demand. It is an open secret that the sulphur content of the present day chilled iron wheel continues permanently above the limit set for the requirements of low grade steel and is therefore almost beyond question above the limits of safety in cast iron.

Bessemer steel, having (compared to iron) great strength in tension, torsion and transverse stresses, is not allowed to exceed a maximum of 0.10 per cent of sulphur. On the other hand no limit is set for the sulphur content of the iron wheel, although it is frequently and in some foundries usually far in excess of these figures.

SLOW AND QUICK COOLING

Perhaps a more objectionable feature in iron carwheels is a method which seems to indorse, as something to be desired, the practice of exceedingly slow cooling. It is well known in the manufacture of steel that air cooling, where properly applied, is not only wholly unobjectionable but for certain purposes is decidedly beneficial.

In a prominent foundry some years ago it was the practice to stack a series of iron tubes one upon the other as high as the foundry facilities would permit, to form a perpendicular receptacle in which the hot wheels were placed and allowed to cool, the whole forming what might be termed a cooling pit above ground. Such wheels stood the drop and thermal tests almost infallibly and the method seemed to indicate that a quick cooling "pit" is more desirable for chilled wheels than one that retains the heat for days.

Patents have been issued on several processes for cooling the thickest portion of the wheel first and so arranged that the flanges would cool more slowly, the intention being to compel the shrinkage to draw toward the hub instead of away from it. One of these patents was issued in the very earliest days of chilled-iron wheel making and was entitled "Oven for Cooling Castings." This patent was taken out by P. F. Geisse in 1859 and was followed by improvements, some of which if used would materially benefit the wheel of to-day. For instance, U. S. patent No. 83,605, to W. J. Cochran in 1868, while cumbersome and susceptible of improvement, incorporated the definite idea of cooling the wheels in a logical manner through the hubs. Other ideas were worked out and patented in order to perfect the process but none of these were as simple as a plan would be of setting pits two or three feet apart so that while no cold air could reach the wheels, yet the radiation of heat would be considerably facilitated and the strength of the wheels increased.

SLOW COOLING OBJECTIONABLE

Slow cooling retards the essential binding together of the crystals, preventing the molecules from joining in the most compact and minute form with the result that under no circumstances can the metal be as dense and strong as when every particle is drawn down to the smallest possible atom, thus compelling every portion to come more closely in contact. Some of these old patents were evidently the result of much thought and bear evidences of careful investigation. It still seems to be logical that setting the wheels in alignment in the pits so that the core holes in the hubs would form a sort of flue and passing the heat to the outer air by means of an adjustable ventilator, more simply devised than any covered by the patents mentioned, would bring about uniform shrinkage, closer grained metal and much stronger wheels.

Metallurgically the old system of making iron wheels has been out of date for years and has nothing to commend it when compared with an adequate and comprehensive method which first reduces the metal to the required homogeneity and which also brings about, by comparatively automatic and therefore positive operations, the desired accuracy in shop practice.

DEFECTS OF THE OLD METHODS

Chilled iron for practically all equipment except carwheels, even in very large tonnages, is now made in furnaces to absolute specifications. In units of not less than 150 to 300 wheels this same system

*The Slocum Lubricating Company, Pittsburgh, Pa.

can be handled to much better advantage than is possible under the limitations of the cupola. No carwheel manufacturer to-day openly claims that the cupola is a modern method of melting and mixing iron accurately. This state of affairs seems to be one that has been the outgrowth of sharp competition for up to the present not one maker has been willing to spend the money necessary to change from the outgrown to the modern plan. Another reason for this unwillingness no doubt is that no one has heretofore taken the trouble to devise a convenient and economical method by which to exploit a wheel plant with a furnace system that would actually make 300 wheels or more on a scientific basis and which would at the same time produce a better wheel for less money.

Under the present system or old style cupola practice it is necessary to melt iron all day long in comparatively small lots, each of which varies from the other more or less, each of which goes through the various stages of hand work from scales to charging door and then is subjected to the usual inequalities of high or low blast from open or clogged tuyeres; good or bad cupola practice; good, bad or indifferent coke; proper or improper fluxing; occasional shutting off of the blast necessitated by a tired elevator, a hot box on the engine or on the fan, an overfilled reservoir, ladle, a broken or burned wire rope on the ladle train or on the hot wheel carriers; a deviation in the quality of one or more grades of iron and other causes with which every foundryman is familiar.

On the other hand, in the commercial foundry, tests are usually made daily from all parts of the heat to discover as far as practicable any weakness in the metal. These tests are made from sections of iron corresponding with the weakest portion of the carwheel, on the theory that the strength of a wheel like that of the chain, is the strength of its weakest part.

PRACTICE OF THE RAILROADS

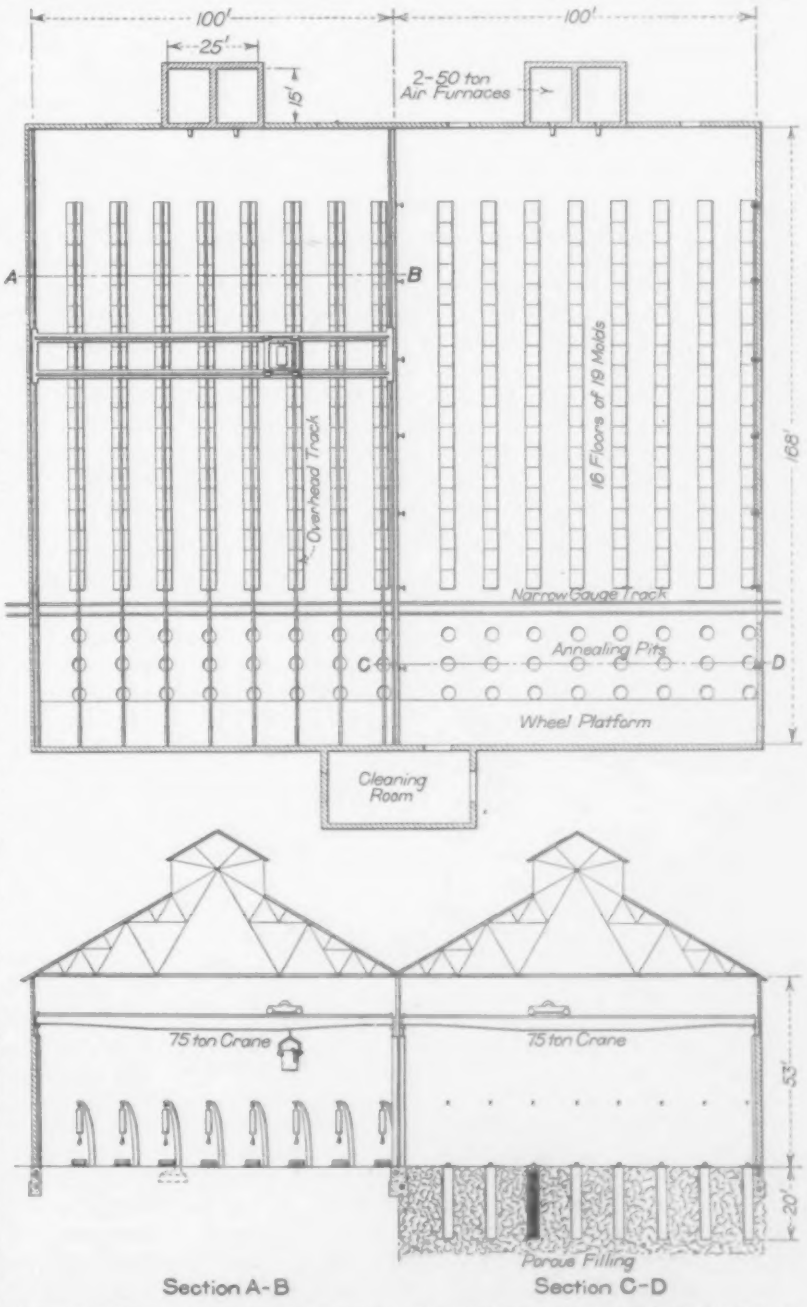
It is interesting to note that specifications drawn by the railroads themselves are not always adhered to in foundries operated by themselves. One of these makers endeavors to justify the application in service of wheels that have not developed normal qualities in tests by stating that they would not consider any improvement that was "not covered by patents" although, as a matter of fact, other lives than employees' are almost always at stake. Tests in one foundry are made on bars for transverse strain that are 2 in. thick and 24 in. long. This metal obviously compares with the hub or strongest part of the wheel and of course is useless as a means of ascertaining the actual strength of the weakest part.

That such inconsistencies should be made impossible appears to be a solution of the difficulty and to that end the writer has mapped out a plan whereby it would be necessary to prepare in advance the details of every heat, compelling the analysis of the iron during preliminary stages, adding or eliminating the various elements as required while the metal is in a molten state and determining daily from time to time just what must be done for the purpose. It is a fact that although every manufacturer is endeavoring to produce good goods at reasonable prices, the larger the cupola and the greater the size of the heat the larger the incentive for our modern Goliaths of the foundry to hunt for tonnage instead of any decided improvement in product. A natural result of this policy is one apparently very different from any outcome calculated.

THE CUPOLA AND AIR-FURNACE PROCESS

Large foundries have been turning out thousands of tons of chilled-iron castings for several years by a method so superior in every way to the cupola method that there is but very little comparison between them. These castings include rolls, crushers and other difficult work.

By comparison it will be seen that such elements in carwheel iron as sulphur, phosphorus and possibly other similar causes of weakness continue in the metal to a great extent by the cupola method



General Plan, with Sectional Elevation, of a Modern Cast-Iron Wheel Plant to Pour 300 Wheels or Multiples Thereof in Two Hours, Using an Air Furnace

and are eliminated or neutralized by the air-furnace process.

The inspection and rejection of material does not of itself prepare for better results in other and later efforts. A peculiar feature to-day of all attempts to eliminate objectionable castings, is that the tests are all applied to the three or four wheels tested to destruction, leaving the castings which go into service almost an unknown quantity except for the surface inspection. Such an outcome appears inevitable when it is remembered that a day's work in a cupola consists of a long series of additions of metal and fuel throughout the day, no two of which applications can, by any possibility, be absolutely alike.

Theoretically it may be said that the problem of uniform carwheel manufacture has already been solved, for such well known concerns as the American Sheet & Tin Plate Company and Seaman, Sleeth & Co. have been making hundreds of tons of large chilled castings daily for years by a method in which all parts of the heat are regulated and adjusted in a uniform and scientific manner.

A PROPOSED NEW METHOD

By the following proposed method many reforms are possible both in the manner and accuracy of melting, in the means of handling the molten metal and in the disposal of the hot wheels after shaking out. By laying out a foundry in sections or units of approximately 300 wheels each, using straight floors with the pits at the end of each floor, as shown in the illustration, it becomes entirely practicable to manufacture any multiple of 300 wheels, say 1200, in eight hours and, when made, the wheels will be a modern product that has been subjected to modifications tending to absolutely neutralize or remove the impurities.

A traveling crane picks up the ladle containing 60 to 75 tons of iron and takes it to the molders' floor directly over the first mold. The operator fills the mold; the ladle is then taken to the next mold and so on. When the first wheel poured is cool enough to strip, the cope is lifted and the floor hoist used to transfer the hot wheel to the pits at the end of the floor.

As will be seen by the illustration, the large units possible to employ in a modern wheel plant derive additional merit from their flexibility, hence the plant outlined is calculated to readily cover the pouring of 300 wheels in two hours or as many multiples of 300 wheels in the same length of time as the dimensions of the plant permit. In other words 1200 wheels may be readily taken care of in two hours including both pouring and pitting, not only with better results as to keeping the metal hot and getting the wheels into the pits cherry red but each wheel will be like the other, metallurgically, so that the tests will actually represent every wheel made by the particular unit in the identical heat from which the test wheels were drawn.

This statement means more, perhaps, to the metallurgist or chemist and the well informed inspector of wheels than it does to the average carwheel maker himself. The air furnace and traveling crane cut off at least 90 per cent of the labor. One man operates the crane and one man opens and closes the stopper in the ladle, making it possible to pour 300 carwheels from one ladle in not to exceed two hours with two men only. In the invariable practice of to-day throughout the United States from two to three men are used for pouring off each floor of 18 to 25 wheels or not less than 24 men for 300 wheels, as against the two men for the same number of wheels by the proposed method. At the same time the wheels poured so expeditiously by the assistance of the traveling crane may be shaken out by common labor as rapidly as required. In order to pour off 600 or 1200 wheels in two hours it is only necessary to install as many units as there are multiples of 300 in the number of wheels required.

The illustration shows plainly the convenience and saving in time in having the pits located at the end of the rows instead of at any other point in the foundry, thus making it practicable not only to get the wheels into the pits faster, but also much hotter than is possible in any other way. This arrangement of the pits makes it possible to keep them further apart than is the usual custom and this spreading will facilitate a desirably more rapid cooling, a closing of the grain of the metal without the aid of sulphur and a consequent definite strengthening of the wheel from the two sources.

ERRORS IN THE OLD PRACTICE

One of the erroneous practices of the present system consists in preventing the wheels from cooling for days, thus keeping the granules of the metal at the largest possible size, preventing the molecules from adhering as closely to each other as they would if the iron were compelled to cool while the latter was in a more subjective condition. In the cohesion of minute particles of metal there is a far greater strength than is possible when these atoms are enlarged to such an extent that grains of manganese, for instance, may be discovered by the naked eye. The same is true as to the fine or coarse grain of other metals in regard to the power of holding together under stress or strain.

By the air-furnace system of melting, the chemist regulates the progress of the heat by testing the metal from time to time much after the manner of the best open-hearth steel practice. When he has brought about the elimination of sulphur, removed practically all of the phosphorus and has brought the combined carbon to the point that will give the desired depth of chill in the castings, the heat is ready to be drawn off into the ladle. At this point the comparison between the cupola and the air furnace is very remote. The thorough reduction of the metal in one large body changes the whole operation. Economies already described will bring the total saving to more than $100 per day aside from the improvement in achieving a definitely standardized metal.

More than one hoist for handling hot wheels can be utilized on each floor by having the overhead track arranged so that other hoists may be run in from the pit tracks as needed. The hoists in order to work in conjunction with floors and pits would require electric power and thus do away with the long piston rod of the air hoist. By this means 300 wheels can be pitted in less time than it takes to pour them and of course 900 wheels can be pitted in the same length of time by applying the necessary number of units which the writer has estimated as three, since it would take two of the 60 to 75-ton furnaces for each 300 wheels.

Many conveniences and economies go hand in hand with such an arrangement. The traveling crane is available to carry to the extreme end of the foundry the scrap wheel heads and sprues. It can be used to bring center and pan cores from the core room to each molder. It will do most of the work of taking molding sand to the floors, etc.

The use of the traveling crane prevents the constant duplication of labor for there is no difficulty in having one crane serve the two furnaces in each

unit. It would be merely necessary to start one furnace and one set of men a little later than the other furnace and the other set of men, precisely as is now done with first and second iron in the wheel foundry so that when the iron from the first furnace is poured the metal from the second furnace will be ready. Two ladles would be preferable to one because the iron in the ladles will be kept hot by a coating of slag and the ladle should not be used again until cleaned but the one crane will suffice.

Two or three manufacturers have brought about an economy which could readily be utilized in connection with this method. This improvement consists in the use of a stripping plate on the drag side of the mold. By its use the bed of the mold is made more uniform than it has ever been possible to accomplish by hand and the countless bad castings due to careless work are practically eliminated.

It has thus far been impracticable to ram the cope side of the mold by any type of machine because of the narrow spaces between the bars near the dish which still have to be "tucked" by hand. Ramming the drag as described makes for another economy since a molder and two helpers will put up 50 to 55 molds with the machine as compared to 25 molds by any other method with an equal number of men.

That the use of the air furnace as an auxiliary in the wheel foundry is entirely practical and that it would be a means of large economy above any claims made by the writer seems to be proved by at least six of the best foundries in the United States, the details of which he is not at liberty to state. Metallurgists have written volumes on the subject of the air furnace and have made its use an easy and available method of making heavy castings true to specifications. Plenty of time is allowed to bring the iron to exact analysis so that metallurgical specifications under this system would be practicable. Test pieces are made, chill blocks are poured and in due course the entire heat is known to be right.

The fact that a bottom pouring ladle, containing sufficient molten iron for 150 wheels, can be placed in position and the entire number of wheels poured in less than an hour and probably in less than 45 minutes should be sufficient to convince the most skeptical if one but remembers the ladles and the countless trips to the cupola during a single heat, still necessary under existing conditions.

The royal welcome which was given to the 100,000-lb. capacity cars will be equaled when modern methods are applied to the manufacture of the cast-iron wheel. It has many points of advantage over steel whenever the conditions are brought about which evolve a sound strong casting and the day is sure to come when a cast-iron wheel will be considered the best as well as the cheapest wheel for freight service.

THE PRESENCE OF NITROGEN

The question of nitrogen has often been raised in connection with carwheel castings. It appears impracticable, however, to essay any improvements in this direction since under existing conditions in order to positively reach each wheel poured it would be necessary to correct the metal separately in each pouring ladle every time the ladle was filled, a task for 900 wheels that would mean 900 times. That this feature of carwheel manufacture should receive attention will be conceded by every one familiar with the risks that are run by leaving this most dangerous of all impurities in either steel or iron.

Large units offer the opportunity for deoxidizing as well as for denitrogenizing the metal. This purification properly carried out removes impurities that have remained in carwheel castings since their manufacture began. The consensus of opinion among metallurgists seems to be that thorough deoxidation is readily accomplished by modern practices and if their views are correct a new and promising field still remains untouched in the manufacture of chilled iron car wheels.

Gaging High Temperatures by Color Identity

A new method of estimating high temperature is offered by a paper before the Physical Society of London by Messrs. Paterson and Dudding, representing original work of a high order. The following from the authors' synopsis gives the general contents:

1. Preliminary experiments are described on the method of "color identity" adapted to the estimation of the temperature of incandescent substances such as metal or carbon radiating in the open; by this method the "true" temperature of certain bodies as distinct from their "black-body" temperature can be arrived at with a very fair degree of accuracy.

2. By the color identity method the total luminous radiation (white light) from a black body is made identical in color with that from the incandescent metal under examination by adjusting the temperature of the black body until there is color identity in the field of a Lummer-Brodhun photometer.

3. Comparisons are made of the results so obtained with those obtained by other methods and the color identity method is shown to give the correct result for melting platinum.

4. An explanation is given of the principal factors and limitations of the color identity method in which it is shown that accurate results should be obtained so long as the bodies under consideration act as "gray" bodies throughout the visible spectrum and that there will be a tendency to error to the extent that they depart from the gray body condition in the visible spectrum.

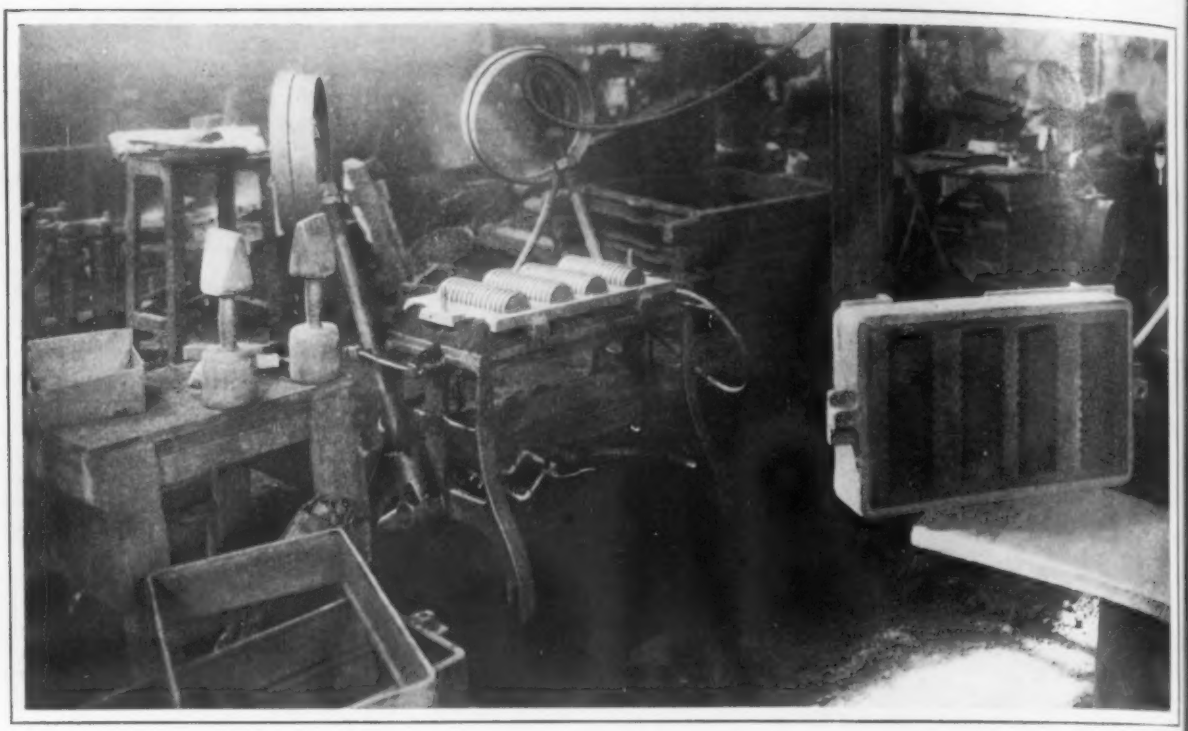
Union Wage Scales in Various Trades

The United States Department of Labor, Bureau of Labor Statistics, Washington, D. C., in Bulletin No. 171, gives the union scale of wages and hours of labor for ninety-three of the principal trades in forty-one of the leading cities of the United States prevailing in May, 1914. It states that the highest scales per hour paid in May, 1914, in a few of the principal trades were as follows: Bricklayers, 87.5 cents, in Dallas and San Francisco; carpenters, 65 cents, in Chicago; hod carriers, 50 cents, in Portland, St. Louis, Salt Lake City and San Francisco; painters, 70 cents, in Chicago; plasterers, 87.5 cents, in Dallas and San Francisco; plumbers and gas fitters, 75 cents, in Chicago, Dallas, Portland, St. Louis, Salt Lake City, San Francisco and Seattle; sheet-metal workers, 68.8 cents, in Chicago and San Francisco; stonecutters, 70 cents, in Portland and San Francisco; structural iron workers, 70 cents, in Cleveland; freight handlers, 60.6 cents, in New Orleans; granite cutters, 68.8 cents, in New York; iron molders, 50 cents, in San Francisco; linotype operators (Hebrew, book and job), 83.3 cents, in New York; compositors (English newspaper), day work, 75 cents, in Seattle.

An interesting trade publication appearing regularly is *Woodison's Wampum Weekly*, published by the E. J. Woodison Company, Detroit, Mich., with branch offices in Cleveland, Buffalo, and a number of other cities. The issue usually consists of a single leaf, but it invariably begins with a catchy anecdote having a flavor of the foundry business. This attracts attention, and reference is then made to some one or more of the foundry supplies handled by the company. Much originality is shown in the preparation of the matter.

Dean Hermann Schneider, of the engineering department, University of Cincinnati, reports the enrollment of over 500 students who will take the co-operative course in that institution. This number exceeds all previous records. The fall term began Sept. 20.

Fig. 1—The Piston Ring Pattern and One-half of the Mold



Foundry Economies in the Ford Motor Plant

Casting Piston Rings Separately, Fifty at a Time—The Saving Effected in Metal, Machining and Quality of Product

The Ford Motor Company, which until recently has been casting its piston rings in pots, four pots to the mold, has adopted the practice of casting the rings separately with marked success. When casting the rings in pots, twenty-two men were used on this work, producing 2500 pots a day, equivalent to 32,500 rings, or an average of 1477 rings per man. Casting the rings according to the present method, at a reduced rate of production, five men are engaged in turning out 4160 rings per day, or an average of 832 rings per man. This unfavorable showing in output per man in the foundry is, however, much more than offset by the saving in metal, in defective castings, in the amount of machining and in the quality of the rings themselves. For a finished ring weighing 1 lb., when cast in pots from which twelve rings can be machined, the total weight of metal per pot, including a proportionate weight of the sprue, was 8 lb., with a clean weight of 6½ lb. Casting the rings separately, the total weight of twelve rings is 4⅜ lb., the clean weight 2½ lb., for a net finished weight of 1 lb., a saving of over 50 per cent of the finished weight of each ring.

This method also makes possible the detecting of defective rings in the foundry before any machining is done and the discarding of the particular ring rather than the whole pot. It is also stated that a much more uniform tension is obtainable in the rings when cast separately than when cast in pots for the reason that the metal at the flange end of the pot cools more slowly because of the heavier section than at the other end, with the result that the metal in some of the rings is appreciably harder than in others. It is the practice,

Fig. 2—The Machine on Which the Piston Ring Cores Are Made. While the cores are being rammed up, the half of the mold in which the preceding cores have been placed is removed and the next mold made ready for receiving the cores

also, to machine these separate rings only on the outside surface, which preserves on the inner side the original skin of the casting, materially improving the strength and service of the piece; and by using an accurately finished core in the mold, it is claimed that the ring sizes may be held within narrower limits of variance as they come from the foundry than was possible in the regular run of machining. This formerly involved the removal of a considerable amount of metal where now only a finishing cut is necessary.

The equipment for making the piston ring molds is illustrated in the accompanying views. Cope and drag are made from the same metal patterns, for two sets of 26 rings, 13 on each side of the two central sprues. For making the core a Pridmore rock-over machine has been adapted, as indicated in Fig. 1. The core mold, which is made in halves, is machined inside to an exact diameter so that the cores will run with a nice uniformity. The core itself is hollow and a special hand rammer is used.

The machine for making the central cores is located in the foundry immediately adjacent to the machine on which the cope and drag are made, so that as the drag is made and the core set in, it is laid on the floor, the cope put on and the mold locked up as fast as it is made. The mold and core are both of green sand. For the convenience of the core maker an inclined portable sand table is used, which is placed alongside of the core machine enabling the molder to pull the sand down by hand into the core mold as required.

Fig. 4—A Pile of Piston Rings as They Are Shaken Out from the Mold

The design of the mold with reference to the gating contributes a detail of considerable advantage. When cool the rings may be broken off from the sprue by a very light shock and there remains on the ring scarcely a mark to show the point of fracture. Fig. 4 illustrates the manner in which the entire twenty-six rings may be shaken from the sprue by one blow on the end.

Molding Cylinders on a Flight Conveyor—Continuous Process Which Saves Floor Space, Increases Production and Betters Foundry Conditions

The methods formerly in vogue at the plant of the Ford Motor Company for the casting of motor cylinders has been previously described in THE IRON AGE. It was the practice to pour these molds in long rows on the floor from hand ladles, the mold then being picked up with an overhead trolley to be carried out to the end of the building where it was shaken out. This process was continuous and served to increase markedly the production as compared with earlier methods. More recently the continuous operation has been modified by conducting it on a traveling conveyor, with the result that output has been increased and the floor space required for the work very much reduced. Of no less importance is the advantage gained in that restricting the movement of the gaseous molds within a definite line of travel has permitted the construction of a ventilating hood immediately over the conveyor. This removes all of the gases and clarifies the atmosphere of the foundry to a remarkable degree. The accompanying illustrations more clearly indicate the nature of the installation.

Fig. 3—One-half of the Split Core Mold Is Removed, Exposing the Cores Over Which the Drag Half of the Ring Mold Is Set, the Mold Being Lined up with Accurate Dowels. The Machine Is Then Rolled Over and the Core Mold Removed as Shown

The conveyor extends from the cupola at one end to the shaking-out grids in an annex at the end of the foundry. The conveyor consists of three parallel strands, the flights of the outside strands traveling toward the cupola and terminating at a cross-over roll-table which delivers from both sides toward the middle strand, the flights of which travel away from the cupola, carrying the poured mold to the shaking-out tables.

The operations of making up the molds are consecutive and continuous. As may be seen from Figs. 5 and 6, materials and facilities are provided in the form of molding sand, machines and flasks on either side of the outer strands of the conveyor. Beginning with the placing of bottom boards and flasks at the end of the conveyor remote from the cupola, successive stages of completion include the placing of the drag, barrel cores and cope, in order, as the mold moves along. In the space between the outer and middle strands of the conveyor the port cores and water-jacket cores are stacked and placed in position as the mold passes. The outer strands of the conveyor on which the mold is built

Fig. 5—The Cylinder Mold Conveyor, Showing Sand Spouts from Overhead Conveyor, Molds and Gas Hood

up travel at the rate of 6 ft. per min., and the inner strand, which accommodates the molds from both sides, travels at the rate of 21 feet per minute. The molds are poured as they approach the

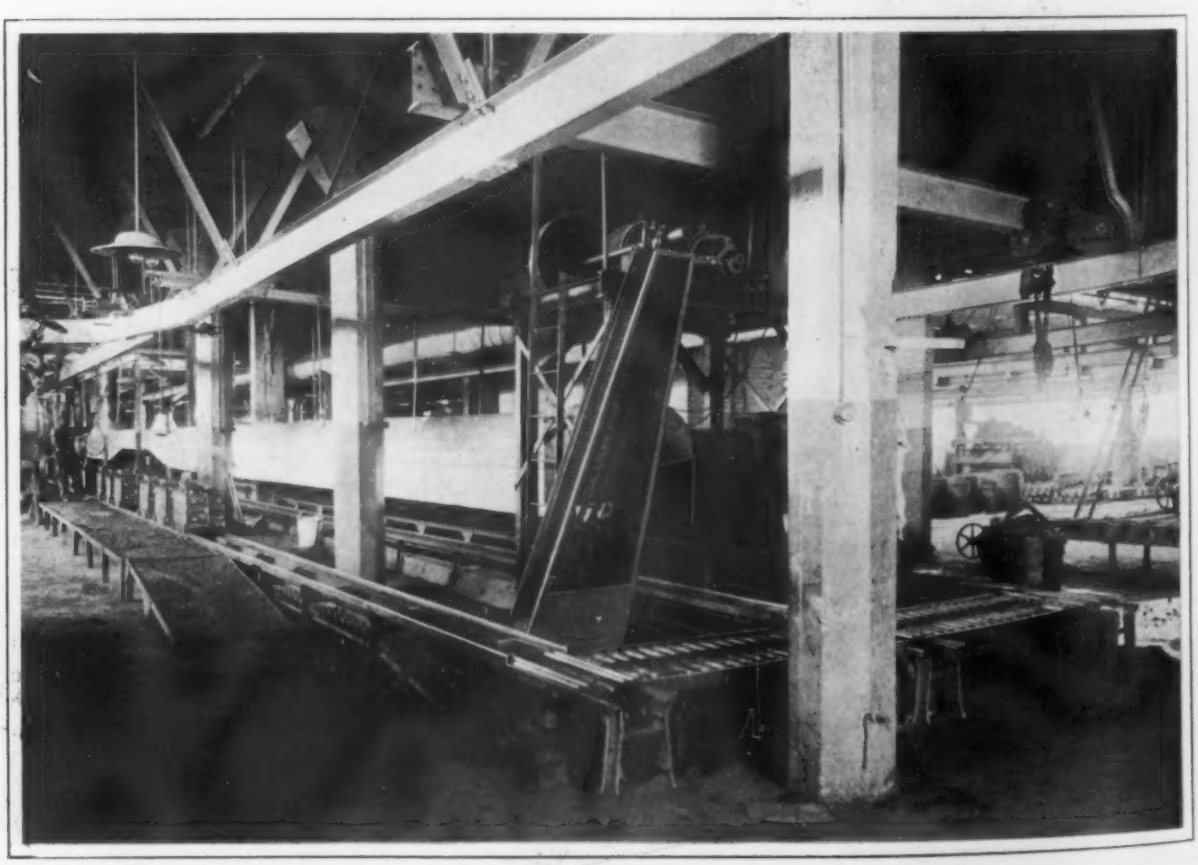


Fig. 6—The Cylinder Mold Conveyor at Cupola End Showing the Roll Table Transfer and Conveyor Drive

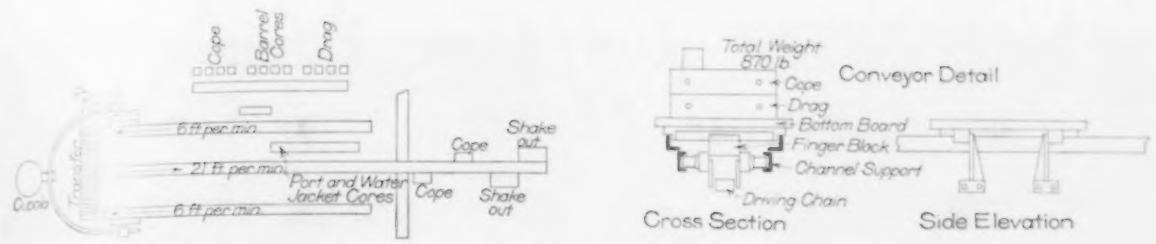


Fig. 7—At Left Is a Diagram of the Continuous Molding Plant and at the Right the Details of the Conveyor

cupola end of the conveyor from 1500-lb. ladles. The ladles are suspended from an I-beam trolley which circles the end of the conveyor and transfers the ladle from the cupola to the pouring position. On the basis of 125 lb. of metal per mold, including the sprue, the conveyor handles 6½ tons of metal per hour, the equivalent in two shifts of eight hours of 1680 molds.

The rate of travel and the length of the conveyor are such as to provide a time interval sufficient for the necessary cooling of the casting in transit, and from Fig. 6 the nature of the ventilating hood for the disposal of gases from the mold is apparent. The provision for shaking out the casting and the general layout of the conveyor are illustrated in the accompanying sketch. Immediately beyond the wall which separates the shaking-out room from the foundry proper, four tables are placed, two on each side of the conveyor and staggered. Above the conveyor a trolley hook is suspended, and, as the mold comes through, the cope is lifted off to the first table, the drag passing on to the next table on the same side, where it is dumped over grids, the casting being lifted out with a trolley hook, the sand dropping through to be reclaimed while the flask is piled for return to the foundry. The following mold, coming through at a short interval, is handled on the tables on the opposite side of the conveyor, and so on in alternation.

The conveyor is built of steel angles and channels, the links being supported by and sliding between two channels. The general design of the conveyor is illustrated in the accompanying sketches. The conveyor flights are arranged with upward protruding fingers which engage with the cleats on the bottom boards of the mold, dragging them along the angles which form the frame-work of the conveyor.

Wheeling Sheet & Tin Plate to Add Tin Mills

S. Diescher & Sons, consulting engineers, Farmers Bank Building, Pittsburgh, are placing contracts for the equipment for six hot tin mills to be added to the plant of the Wheeling Sheet & Tin Plate Company, Yorkville, Ohio, subsidiary of the Wheeling Steel & Iron Company. The Fort Pitt Bridge Works, Pittsburgh, will furnish 2500 tons of structural steel, the larger part for an extension to the mill building and the remainder for extensions at the parent company's Wheeling plants. The order for six hot tin mills, 28 x 34 in., and four cold mills, 26 x 34 in., has been placed with the Wheeling Mold & Foundry Company. A hot mill engine, 32 x 60 in., will be built by the Bass Foundry & Machine Works, Fort Wayne, Ind. Contracts for floor plates, etc., have also been placed. The new mills are expected to be ready for operation about May 1, 1916, and will give the company an 18-mill plant. It is expected that six more mills will be added later. The parent company's plans for additions to its plants at Wheeling include a sheet-bar mill to make bars for the tin mill at Yorkville and for the open market, and it may also decide to erect some open-hearth furnaces, as it makes only Bessemer steel at present. Some large additions to the pipe mills are probable.

Fig. 8—Delivery End of Conveyor Showing the Shaking Out Tables

How to Get High Core Efficiency

Desiderata as to Sand, Binder and Baking in This Important Foundry Department—Temperature Must Be Uniform

BY H. M. LANE

Efficiency may be defined as getting the most from the means at one's disposal.

It is obvious that to realize the highest efficiency in a foundry core room we must have efficient core boxes and the core-making operations themselves must be conducted in an efficient manner; but in this article we shall consider only the sand, the binder and the baking.

QUALITIES OF CORE SANDS

There is such an interdependence between the sand and the binder that it is impossible to say which sand will be best without knowing what binder is to be employed. To produce good work a sand must vent freely, no matter what binder is used; hence the grains of the sand must be of sufficient size to permit a free venting—that is, a free escape of the gases.

In the case of cores which are not protected with a surface coating of either blacking or silica wash we must have the grains of sand sufficiently fine to prevent the metal penetrating between the sand grains. We must also look after the fusible qualities of the sand. For aluminum and brass it is rare that a core sand will show any tendency to fuse. With gray iron certain minerals contained in the sand may have a tendency to fuse or slag, and with steel all minerals having a low fusing point must be avoided.

For large cores for gray iron work where the surface is protected by a heavy coat of blacking, the body of the core can be made of almost any grade of fairly strong sand. Such cores as this are generally made with a bonded sand—a sand containing clay. Whenever such sand is used care must be taken to see that the artificial binder is of such a nature that it does not oppose or act against the clay. The binders which work well with clay include flour, starch, dextrine, black or pitch compounds, molasses, glutrin, sour beer or distillery refuse, and similar compounds.

Where clear sharp sands are employed a binder must be used that will dry down to the contact points of the sand, thus placing the binder in the point where it is most efficient. Linseed oil is the most efficient binder of this type and other drying oils belong in the same class. Pitch and rosin also have a tendency to melt and flow to the contact points.

For a sand to be efficient it must produce a core of the desired strength, venting qualities and metal resisting conditions with the least expense.

CASTINGS DETERMINE SANDS AND BINDERS

The character of the castings turned out determines to a considerable extent the type of core which must be used. Where thin cores with the minimum number of rods are required, as in automobile cylinder jackets or radiator loops, we must use sharp sand free from loam and bond it with the highest grade oil obtainable. This generally means we must use an expensive sand and an expensive oil. The writer knows one case in which there was available a local supply of sand which could be obtained in the shop for about 50 cents a ton. Tests were run to see how much oil it took to bind this sand to a given strength and it was compared with a number of other sands. A lake sand shipped in from a distance at a cost of $1.50 per ton was first chosen as being more efficient than the local sand and the mixture of sand and binder required was costing less per ton of mixed sand. The experiments, however, were carried still further and finally resulted in the selection of a washed silica sand costing about $3 per ton. This took very much less oil to give the required strength and gave a core which vented much more freely. The result was a very marked decrease in the number of bad castings. This last statement brings up a point in core efficiency which is very often neglected. The mere cost of the mixture is lost sight of when it is possible to make a big increase in the number of good castings, or when it is possible to simplify core-making operations, such as the use of wax tapers for forming vents, which must be carefully placed when making the cores.

The selection of the binder is just as important as that of the sand, and it must be chosen with a due consideration of all the factors involved. It is usually true that to obtain the best results in any core room it will be necessary to use from three to six or eight binding materials.

When the core-making problem involves a considerable portion of the molding and core-making expense taken together it pays to watch every point to make as many savings as possible. It also pays after having standardized the core-making mixtures to see that they are kept up to standard.

Some years ago tests were run along these lines. For any foundry to conduct tests of its own it should first have on hand means of accurately measuring the materials from which cores are made. Second, the mixing machinery should be suited to the work in hand. Third, there should be an oven in which the baking conditions can be controlled.

Oil sand mixtures can be very thoroughly blended in a mixer of the paddle type, but when it comes to mixtures containing clay, flour, starch, dextrine, and other compounds, paddles alone will not give the best results and the material should be both mixed and rolled. Rolling alone will not give the best results.

TESTING CORE MIXTURES

Every large producer of cores should have in his foundry a core-testing machine and it should be a regular practice to test the core mixtures as they are being made from day to day. Also every new shipment of sand or binder should be tested. If the men are left to their own devices they will make many strange changes in the mixtures.

When beginning the tests referred to, the writer sets out to see how closely the results obtained in any given test could be reproduced, and in this connection a considerable quantity of a very uniform grade of lake sand was taken and put in bins. A man was told to make a given number of cores every day for a given number of months and test them each day. At first the results ran very uni-

form, but there was a gradual increase in strength. Suddenly the strength fell off in a very marked manner. This caused an inquiry into the work. The sand was stored in several deep bins or boxes, such as a grocer uses for keeping sugar. When stored it had been pretty damp. In the warm laboratory the surface had dried out. During this time tests were being run along other lines using the same sand, and the sand for the test was taken from a given bin until that was empty. The sand at the top of the bin when the test was started was quite dry. As the men worked down through the bin the sand became more moist and the last sand taken from the given bin was quite moist. These cores showed considerable strength. The next day the workman took the sand from a new bin, getting thoroughly dried surface sand, and immediately the strength of the cores fell off. To investigate this, a sample of the sand was taken and dried at 212 deg. Fahr. From this sample a given amount was measured out and to it 10 per cent of water (measured by volume) was added. The mass was then thoroughly mixed and an attempt made to put it back into the measure, when it was found that the volume had increased more than 30 per cent. Further tests showed that the expansion was simple. Dry sand settles down until the grains are thoroughly in contact. With wet sand when the grains meet, the moisture on the surface causes the grains to adhere in whatever position they strike, and hence wet sand without ramming does not pack as tightly as dry sand. If, however, sand is flooded with water it will set in less volume than when dry.

After this discovery the writer advocated the drying of all sands for core-making work, and later tests were run upon the critical moisture condition of a sand. It was found that the drying of a large pile of sand on the surface would affect only a few inches or a foot, and from this point down to the bottom of the pile the moisture was generally a constant depending upon the size of the grains and their capillary action in holding moisture. Certain tests showed that a washed silica sand carries less than 2.5 per cent moisture, even when examined after a heavy rain; beach sand from Lake Michigan was found to carry a little over 5 per cent and a very popular bank sand carried a little over 7 per cent. Some fine molding sand carried from 9 to 12 per cent.

The interesting point is that when any one of these sands contained its quota of moisture it would feel as wet as any other containing its quota. This showed distinctly that it is impossible to judge the percentage of moisture in sand without first having a knowledge of its moisture-carrying qualities.

From these observations it was found that where sand is piled from 6 to 12 ft. deep in a bin the moisture condition of the entire mass will remain very nearly constant, and if the sand for use is taken from the face of the pile the amount of moisture coming to the mixing machines will practically be a constant. For this reason it is not necessary to dry all sand in ordinary commercial operations. For laboratory tests the sand should be dry or a moisture determination should be made.

The reason for the use of dry sand for tests is that if cores are to be tested it is important that the amount of moisture mixed with the binder be a constant. The strength of oil sand cores can be increased by increasing the percentage of moisture in the sand. This is due to the fact that the moisture assists in carrying the oil to the contact points of the sand, thus applying the oil in a more efficient position.

CLOSE AGREEMENT IN RESULTS IS POSSIBLE

In the above-mentioned tests it was found that if we standardize conditions, use dry sand for making our cores, and always use the same percentage of moisture with the binder, a man could make cores week in and week out which would break within 5 per cent over or under, and in some cases we made them with an even narrower margin than this. In the test referred to the cores were all baked in a small oven in which the temperature was very closely controlled, and the baking time was always a constant. There were, however, no conditions in this laboratory work which could not be easily reproduced on a larger scale in the core room. One important point in the test referred to was that it was necessary to insure a real mixing of the materterial.

In one case two mixing machines, one of the paddle type, and one of the roller mill type, were set up side by side and run on the same mixture with a beach sand, oil and water for the mix. It was found that the paddle mixer increased the strength of the mix rapidly in the first few minutes, and then gradually until the maximum strength in this case was obtained with a little less than 10 minutes' mixing. From then on results held constant, though the test was held for two hours. In the case of the roller mill, however, the strength increased for about 7 minutes when it reached the maximum. From that time on it fell steadily until at the end of an hour it had lost half of its strength. This led to an investigation as to the action of the roller mill on the silica sand and oil mix, and it was found that the roller mill ground dust off from the silica grains, and that this dust held the oil away from the contact points of the sand.

BAKING AS IMPORTANT AS MIXING

The tests thus far outlined indicate that it is possible to select the most efficient method of binder and sand, for use in any given case, but the selection of binder and sand is hardly more than one-half the problem. The baking of the cores is, if anything, more important than the mixing. There is a critical temperature for every binder. In the case of flour, starch or dextrine we are practically dealing with a bread-baking problem, and what we have to do is to drive out the excess moisture and harden the paste in its most efficient form without burning or charring it. In the case of molasses our problem is to drive out the moisture and reduce the molasses to a stiff taffy without charring or burning it. In the case of an oil of the drying type our problem is to oxidize the oil to give an efficient paint value.

In practice it has been found, however, that in all three of these cases the temperature should be carried slightly higher than that which produces the greatest strength. The reason is that there are some compounds in the binder which if slightly broken down, will greatly reduce the amount of gas given off by the core when metal is poured around it. This is the reason why oil cores seem to give better results when baked to a light brown color. There is, however, a definite baking temperature for each compound. Flour should not be as hot as oil, and in the case of rosin or pitch all that is necessary is thoroughly to melt the rosin or pitch so that it flows between the sand grains. In the case of rosin cores care must be taken not to heat them to such a temperature as to break down the rosin. This reaction does not occur, however, until slightly above 600 deg. Rosin, however, will show a distinct weakening at a lower temperature than 600

deg. Fahr. and any core will show a weakening if kept for any considerable time at a temperature of over 450 deg.

AN OVEN WITH UNIFORM HEAT

In bread baking it has been found necessary to hold the entire oven at a uniform temperature. The old method of doing this was to heat the oven with a fire until the brick work was all hot, and then to rake out the fire, give the oven a short time to equalize temperature, and then accomplish the baking by means of the heat stored in the brick. The more modern bread-baking ovens resort to constant heat from gas or from specially constructed steam coils. The essential point in these ovens is that the temperature must be even through all parts of the oven.

Foundrymen have been very careless in their arrangement of the ovens, and this has necessitated an excess of binding material to overcome the fact that a portion of the binder is destroyed with excess heat in some parts of the oven. The tests which we ran resulted in our looking around for an oven which would give uniform heat. At that time only one oven was on the market which filled these specifications.

With an ordinary coke fire it is necessary to maintain a temperature of over 1800 deg. to burn the coke efficiently, and as already stated cores should be baked in most cases at a temperature of not to exceed 450 deg., and hence it is necessary to insure some method to reduce this high temperature to a uniform low temperature. At the same time it is necessary to force a sufficient volume of air through the oven to carry off the moisture that comes off the cores. Some of the devices that resulted from these tests are covered by applications now in the patent office. All the general results are given freely, and any foundryman with suitable testing apparatus can standardize his core-room practice and find the sand binder which will give him a ton of core sand at the least possible cost. The only weak point in the modern foundry, however, is the core oven and the foundryman must arrange for uniform baking temperatures if he is to get the maximum efficiency in this part of his plant.

Principles of Continuous Melting Applied

The Item of Capital Investment and Other Arguments Which Favor Continuous Molding—Observations Based on an Extended Experience

BY J. FRANKLIN ERVIN*

The foundry presents a problem of handling a material that is liquid only under temperatures much above our surrounding atmosphere, and at such temperatures capable of destroying or burning almost all cheap metallic substances which may be used for forming it during solidification. The sand bed, which lends itself readily in conforming to pattern shape and resisting the hydraulic pressure of molten metal while at the same time being refractory at iron temperatures, and cheap in most localities, has proved through all investigations to be the most practicable material for this use. The foundry problem then resolves itself into one of making and handling sand molds and a high temperature liquid in the most economical way, with respect both to labor and capital invested.

CHARACTER OF PRODUCT

The type of castings to be molded enters into the problem initially and in a very important way if the product be such as is common in our malleable and light machine molding. In gray iron work the production of molds per man is necessarily large and in turn the floor space, or square feet of building area, mounts up to a considerable proportion. If the product be heavy, the floor space per man is generally lower, due either to the difficulty of producing the mold or in most cases to the large amount of iron necessary to be poured by the molder throughout the pouring period.

An average analysis of a product as manufactured under the non-continuous method will show, clearly, the average number of square feet of building space used per molder and the average amount of good castings produced yearly per man. These items are largely dependent on the average weight per mold, although the amount of core work, molding equipment and pattern mounting are not to be overlooked. They give a quick check on the overhead charges per ton of castings produced, since each square foot of land and buildings costs the same whether it produces 150 lb. per sq. ft. per annum, or 1000 lb. for the same period. Heat, light and general service also, are to be considered.

CAPITAL INVESTMENT

The amount of fixed investment involved in the production of castings may be divided into land, building and equipment. The land is dependent upon location, but buildings and equipment are approximately at one price throughout all manufacturing localities. Buildings and equipment cost varies from $10 to $45 per ton per year output, but may far exceed this on special or difficult patterns. This item is divided generally, 65 per cent for buildings and 35 per cent for equipment.

When we allow 6 per cent interest on the money and 4 per cent on buildings, and 15 per cent on foundry equipment, the fixed charge per ton will vary from $1.40 to $5.10 per ton.

POSSIBLE ECONOMIES

Numerous plans and detail developments may cheapen the product, but a large saving frequently cannot be made unless the complete plan be altered. An analysis of cost in the foundry distributes it to four main divisions:

	Per Cent of Total Cost of Castings
1. Molten metal	44
2. Labor—molding and pouring	35
3. Miscellaneous labor	6
4. Fixed charges	15
Total	100

A further analysis of the molten metal charge shows that this is very largely dependent upon the

*Foundry engineer, Moline, Ill.

cost of materials. Therefore, the remaining three charges are the only ones subject to further alteration or improvement.

Under the present system the molder makes molds seven hours and pours iron three hours, or in a 10-hr. day 70 per cent is spent in molding and 30 per cent is spent in pouring, which is partially non-productive labor; first, because the molder earns a high rate and secondly, because of inability to deliver iron to his floor in sufficient quantity to allow him to work efficiently during the pouring period, and lastly, because the primary producing function of the plant is halted to perform a second operation on the product. Finally the floor space necessary per man in a foundry is almost double the requirement per man in all other classes of manufacturing, since a large area is required to contain a day's output of molds.

A summary of the above items shows that the opportunity for large saving is in reducing the floor space per man and at the same time allowing the molder to mold uninterruptedly throughout the day. This can be done only by the adoption of a proper design of building and equipment to handle molten iron to the molder periodically, remove hot sand and castings, and return new sand, conditioned, or to handle flasks and molds away from the molder where they are poured and the flask and conditioned sand returned. Any such operation is known as continuous pouring.

TYPES OF CONTINUOUS FOUNDRIES

Several types of continuous melting foundries have been built, some of which convey the molds from the molder and return the flasks, while others might be classed as semi-automatic, where the molds remain upon the molding floor and are poured and dumped at intermittent periods throughout the day. The conveyor type, which may be a two-story foundry, is applicable to uniform molds and flasks while the intermittent type, always having the two stories, the upper floor for the molding and the lower floor for cleaning castings and conditioning sand, is applicable to both uniform and irregular work.

SAND HANDLING IN CONTINUOUS WORK

Conditioning of sand is very important and is one of the problems which have been difficult to solve since too much agitation of the sand allows it to segregate into particles of bond and particles of sharp sand. This can best be avoided by dropping the sand through grates from the molding floor to the tempering floor, there wetting it down and allowing time sufficient for it to soak, then elevating it to the second floor, allowing as little rolling action as possible.

The individual unit system of returning the sand to the molding floor consists of one elevator for two molders, which makes operation very flexible in case of accident to any part of the mechanism. The capacity of these elevators should be such that a day's sand requirement for two molders could be elevated in a period of about one and one-half hours. This arrangement has the advantage of allowing any repairs to be made to the elevator between times of supplying sand, and it has the further advantage of allowing a sand storage at the molder which is easily accessible, and tempers after mixing through the elevator. Any device for mechanically mixing the sand must necessarily be a rapid revolving, cutting or crushing disintegrator, since any slow rolling mixer allows the particles to segregate.

Molds must be dumped while the castings are hot which leaves the castings to be handled subsequently, in the heated condition. Therefore the castings must pass into some storage space before they can be satisfactorily handled for cleaning. This difficulty is overcome in the non-continuous method by having the castings shaken out at night so that they are sufficiently cooled before morning to be handled. The time required for cooling these castings is dependent largely on their physical characteristics since some castings have large surface areas and the ratio of weight to surface is small, while others have a large weight-surface ratio and are necessarily slow to cool.

The immediate removal of the castings from the molders' floor is necessary if the minimum floor space is to be utilized, and this may be accomplished by having large cast-iron reservoirs in the form of inclined chutes attached to and opening from the upper or molding floor. Such an arrangement is installed in the foundry of Deere & Co., described in THE IRON AGE, Jan. 7, 1915.

The successful operation of a continuous foundry using a minimum floor space for the molder requires that iron be delivered to the molding floors beginning soon after molding is started and continuing uninterruptedly throughout the day. This is necessary to avoid congestion of molds on the floor. The continuous operation of the pouring and dumping crews also allows a much more thorough and efficient organization of this labor.

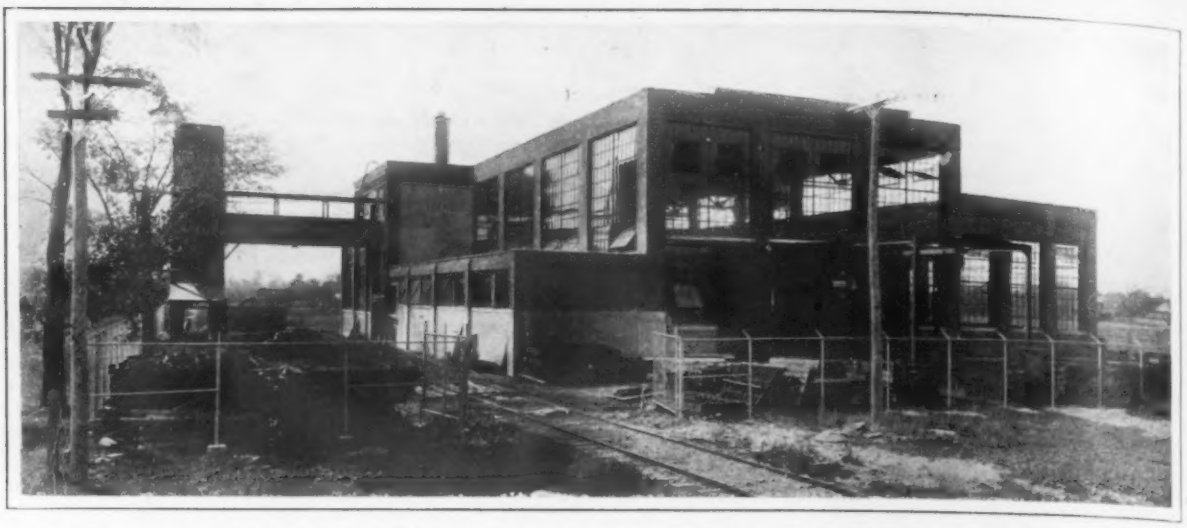
SAVING FLOOR SPACE

The area necessary for molding with continuous pouring is about 50 per cent less than the corresponding area required in non-continuous operation. When the castings are cooled in between floor reservoirs, the molding floor area is duplicated in the area necessary to tumble, grind, chip and condition the sand, which effects a total reduction of building area of about 25 per cent and a total reduction of land and roof area of 50 per cent, when a like number of molders are to be operated. For the same production the area is an additional 20 per cent less, since each molder is employed at molding, continuously, producing a quantity of work 20 per cent greater.

Handbook of Panama Canal

An official handbook of the Panama Canal, of particular value to shippers, has been published by the Government Printing Office, Washington, D. C., in the shape of a 58-page, 6 x 9-in. pamphlet with a number of halftone illustrations of parts of the canal and a map of the canal zone. The main divisions of the handbook cover the following subjects: Distances saved, including a table of the actual reduction in mileage effected by the Panama Canal; how a vessel is handled through the canal; facilities for shipping, including the arrangements for repairs, the prices of supplies and the charges for different services; savings in cost; tolls, sailing ships, a number of which are using the canal at costs explained in some detail; the canal and the navy; features of construction and traffic routes.

Antimony smelting in California is active. The Chapman Smelting Company of San Francisco has resumed operations after several years of idleness, according to the *Engineering and Mining Journal*. A new smelter has been erected at San Pedro using native California ores, operated by the Western Metals Company of San Francisco. A new plant is also being erected at Harbor Industrial City, Cal., by the Merchants Finance Company of San Francisco, capable of turning out 1000 tons of antimony per month.



The Foundry from One End, Showing the Railroad Track with Sand Bins on the Right and a Yard for Melting Stock on the Left, which is Transported Over the Railroad on the Metal Bridge. The Large Amount of Glass in the Walls Is Noticeable

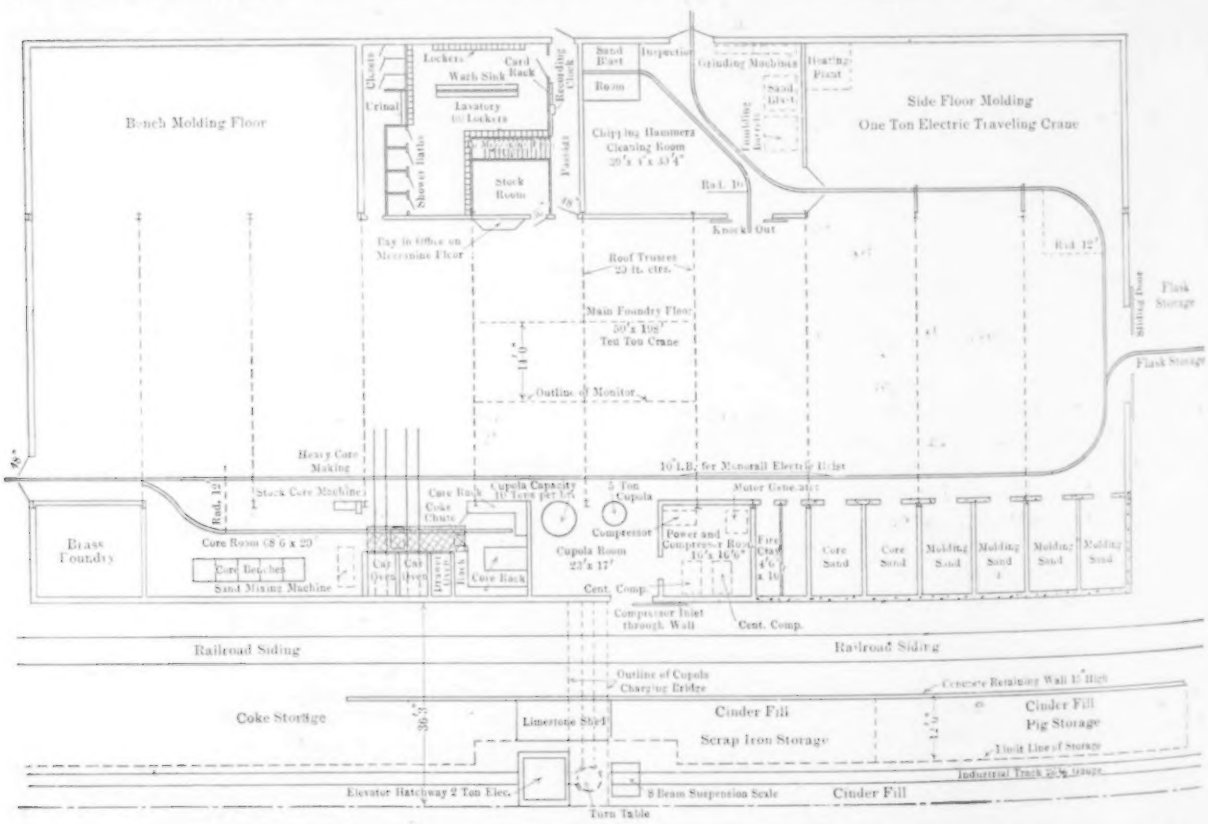
Iron Foundry for a Manufacturing Plant

The Werner & Pfleiderer Company's New Arrangements for Making Intricate and Varied Castings—A Steam Oven for Drying Cores

Any company manufacturing a varied line of highly specialized machinery has to solve a more difficult problem in providing an efficient foundry than is the case where the line of manufacturing is highly standardized, or rather consists largely of repetition work. The Werner & Pfleiderer Company, at Saginaw, Mich., manufactures all classes of baking and chemical machinery, including machinery for making bread, macaroni, biscuits, etc., and machinery for the chemical, pharmaceutical and rubber trades.

The mixing machinery for the chemical trades alone is carried in thirty sizes, ten types and three strengths to meet various demands. Some of these have to be steam-jacketed, water-jacketed, or containing other special features. They are not only made of cast iron, but also of steel, bronze or acid-resisting metals, and this further complicates the problems in the pattern shop and foundry. The castings must be as accurate as the most rigid demands of the machine-tool trade, and at the same time, in many cases a given casting may not be required more than once or twice a year. The work runs from exceedingly accurate castings of a few ounces in weight up to massive bases or machine frames weighing thousands of pounds.

The company has secured a considerable tract of land in South Saginaw, where it intends ulti-



General Plan of the Werner & Pfleiderer Company's New Iron Foundry

mately to establish the entire plant. The foundry is the first building of this series to be erected. In addition to the requirements above outlined, provision had to be made for a considerable growth in the size of the plant and for the handling of the raw material and finished product with the least amount of manual labor. At the time the preliminary study of the work was commenced, the daily melt averaged only 7½ tons. Since that time this has been largely increased.

The general arrangement of the design adopted is given in the plan. This shows a foundry of ten bays of 20 ft. each, or a building 200 ft. long. For the present only seven of the bays have been constructed, or 140 ft. of the building. The brass foundry has not been installed and the core department is much smaller than it will be in the ultimate installation. The center bay is spanned by a 10-ton crane, furnished by the Shaw Crane Company, Muskegon, Mich. The original plan was to construct some concrete molding pits in the center bay, but finally the central portion of the foundry was excavated to a depth of 6 ft. and filled in with molding sand, so that pits could be dug at any desired location.

Main Bay of the Foundry with Monorail at the Left and the Foreman's Office on the Second Floor at the Right Behind the Cage of the Traveling Crane. The Cleaning Room Is at the Right with the Monorail Entering It

HANDLING OF THE RAW MATERIALS

For handling raw materials a railroad track is run in at the back of the plant. Core sand, molding sand, and other supplies are delivered from this track into bins in the foundry building, so that there is no trouble from frozen sand, and also so that the supply is readily available from the inside of the building. The doors through which this material is shoveled are closed with iron shutters.

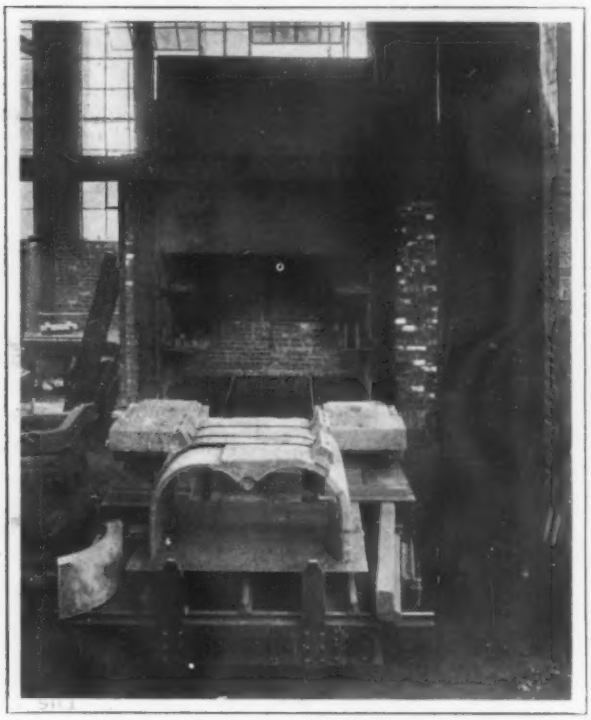
On the other side of the track, the side away from the building, a stock yard for all melting stock is arranged. The general arrangement of the track, sand bins, pig iron, elevator and bridge are shown in an illustration. The charging elevator is located in the center of the stock yard, and a multiple beam charging scale of the Howe suspension type is installed near the charging elevator. The charges are made up in the yard and taken to the charging floor on cars. The steel bridge from the elevator to the charging platform is located 22 ft. above the railroad track so as to comply with the traffic laws. This arrangement of stock yard and sand bins eliminates all surface traffic across the railroad track from the foundry yard and minimizes the risk of accident.

A transfer track extends the entire length of the charging floor and the cars of material are arranged in the order in which the charges are put into the cupola. Only one of the cupolas has yet been installed. It is planned to introduce the other when increased capacity is required.

THE POWER ROOM

At the foundry erection, alternating current was all that could be obtained. In order to secure the distinct advantages of a direct current crane, provide for a more simple monorail trolley, and also to make it possible to use a magnet if required, it was decided to install a motor generator set to supply direct current. The saving in installation of the crane and monorail equipment was sufficient to cover the cost of the motor generator set. One illustration shows the power room; the motor generator set can be seen on a bracket against the wall in the corner. At the right there is a direct motor-driven General Electric Company centrifugal blower which supplies the blast for the cupola. When the additional cupola is installed a second unit will be placed next to the one already in use.

At the left in the illustration can be seen the air compressor, made by the Chicago Pneumatic Tool Company, which is a belt-driven unit. A cen-



The Core Oven with Car Carrying Some Characteristic Cores

tral switchboard is shown at the back. This arrangement gives a very compact power room and an exceedingly efficient one.

MOLDING SPACE AND HANDLING APPLIANCES

The central or main bay of the foundry is shown in another illustration. The greater part of the space under the traveling crane, which is devoted to heavy and medium work, is prominent. Some molding machines, suitable for this class of work, are on order and will be installed in the near future. The general plan shows the arrangement of the floor, and from this it will be seen that there is considerable side floor space suitable for small work, situated next to the cleaning room. When the additional 60 ft. is added to the foundry this will also add another side floor 60 ft. long.

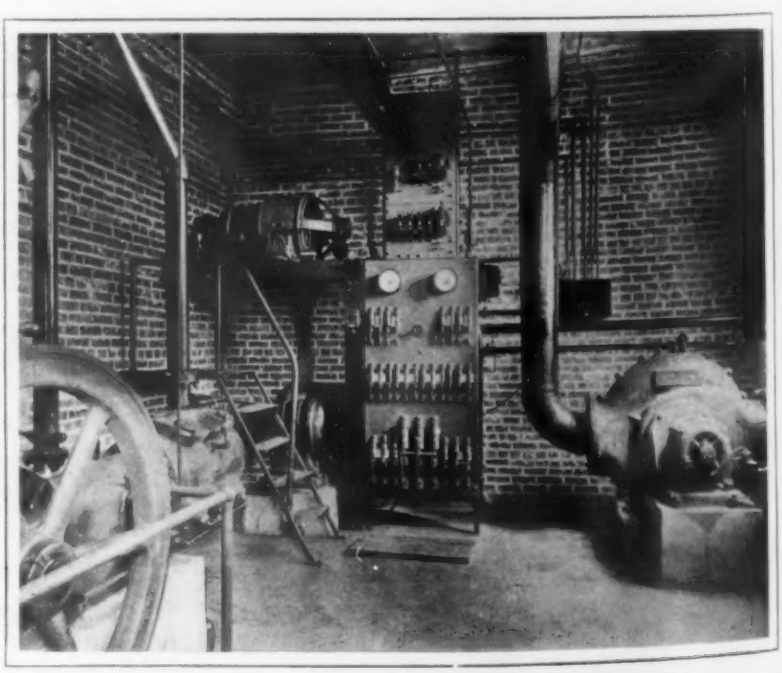
The flasks are stored in the yard at the end of the plant, the heavier ones being handled in and out by means of the monorail. The intention is to ultimately extend this monorail so as to cover a considerable portion of the yard, thus providing a storage for heavy flasks. When the core room is carried to its ultimate size, the crane with the bridge and elevator for handling the melting stock will also be used for bringing the coke to the core room, the coke being dumped from the charging floor into a chute which runs down the side of the core ovens.

The 10-ton crane serves the central bay and a monorail passes along the side of the foundry in front of the cupola out to the yard at each end and around through the cleaning room as shown. This is a Pawling & Harnischfeger outfit of 2-ton capacity. The monorail delivers flasks from the yard to any part of the floor under the traveling crane; it also carries all of the light and medium castings to the cleaning room, moves the buckets of waste sand, the slag from the cupola drop, and any other discard material out to the yard at the end of the plant, and also serves to load the castings on wagons for shipment. Ultimately the system will be extended through the machine shops when they are erected on the adjoining property. In the plan it will be noticed that there is an auxiliary I-beam trolley paralleling the monorail, through a portion of the cleaning room and around to the sand blast room. On this monorail there is a triplex chain block which is used for handling heavy castings while they are being cleaned, or for handling them into and out of the cleaning room without calling upon the regular monorail operator.

THE CORE DEPARTMENT

The jacketed mixing machines require some very intricate cores. Some of these large cores on the car ready for running into the oven are shown in an illustration.

The Werner & Pfleiderer Company manufactures baking machinery for a wide variety of trades. Its steam bread baking ovens are famous all over the world. The core oven is a steam oven operating upon a patented principle, the details being shown in one of the illustrations. There are a series of closed pipes which contain a certain amount of liquid. They are welded up at both ends. One end of each of these pipes extends into the fire box and the other into the oven. The liquid in the pipe boils, generates steam or vapor, and, as the pressure increases, the boiling point of the liquid rises, and hence the condensation point of the vapor rises, and finally the vapor is superheated. This makes it possible to obtain a much higher temperature than can safely be obtained in ordinary core ovens. The fire box is very small and the entire arrangement is simple in operation. The fire box is arranged at the back of the oven and the heat conducted up the back wall and across the roof. This, in connection with the heating pipes under the floor, give a very uniform and thoroughly satisfactory heat for baking cores. Wall shelves are provided for baking small cores during the day and several bakes are taken from the oven



The Motor Generator Set, the Direct-Driven Cupola Blower and the Belt-Driven Air Compressor in the Power Room

each day. As in the case with all other bread baking ovens, it is provided with dampers for controlling the flow of air through the oven and the extraction of moisture from the cores.

The heavier cores are made at the end of the foundry under the traveling crane, or under the monorail, which can be used as a core-making crane when the main crane is tied up with work on the molding floor. The smaller cores are made on benches under the side bay at the end of the melting department. The charging platform extends over a portion of the core room and also over the power room.

THE CLEANING DEPARTMENT

The cleaning department is located midway of one side of the present foundry. If in the future more space should be required for cleaning, a portion of the side floor devoted to light floor molding can be taken for this purpose, and the walls of the cleaning room shifted. The room is equipped with a Sly sand blast tumbling barrel and with a Sly sand blast room. This process has been found much cheaper than the old one of hand cleaning or tumbling. In addition, provision has been made for a tumbling barrel and a double electric grinder.

There is a second floor over the lavatories and stock room which is devoted to pattern shop and storage and the foundry superintendent's office. This office commands a view of the entire foundry floor in the main bay of the foundry through a bay window, which can be seen on the right of the photograph of this department. The foundry foreman's office is adjoining both the pattern storage and the pattern shop, so that these departments are under his constant attention. The floor of these is reinforced concrete, which makes the pattern storage and the foreman's office fireproof, protecting both patterns and records.

SANITATION, LIGHTING AND VENTILATION

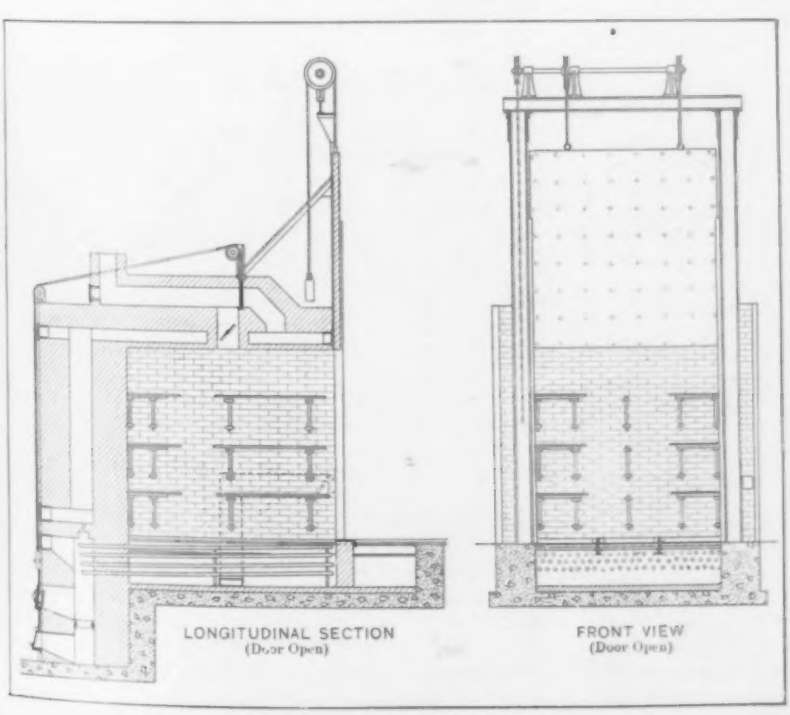
A large wash room with individual lockers for the men, tables on which they can eat their lunch, individual wash basin, and shower bath has been provided as shown in an illustration. This department is kept locked most of the day, but is opened to the men in the morning, noon, and at quitting time. The closets and urinals are arranged with a separate entrance from the foundry. The time clocks are located in the main entrance passage, between the lavatory and the stairs leading to the foreman's office, pattern shop, etc.

The Locker and Wash Room. Note the fireproof construction with the reinforced concrete floor above, rendering the pattern shop and pattern storage fireproof

An abundance of daylight has been provided by making as much of the side walls as possible of Fenestra metal sash. Swinging ventilating sash in the upper and lower portions of the walls provide ventilation throughout the main portion of the building. In front of the cupolas a short monitor 50 ft. long has been provided in the middle of the foundry to take the gases which arise from in front of the cupola, and also to provide additional light in the part of the building where the amount of side light was curtailed by the charging floor, the toilet facilities, etc. This monitor can be seen in the illustration.

A considerable number of Swartout ventilators have been placed on the roof to take off the smoke. These are kept closed most of the day, but are opened at casting time. For artificial illumination clusters of incandescent lamps are used in the side bays of the cleaning room and other minor departments, and in the main bay Cooper-Hewitt quartz tube lights have been installed.

The company's castings in the past were produced partly in a leased foundry and purchased partly on the outside. Only a comparatively small number of patterns had been provided with permanent equipment in the shape of metal flasks, follow boards, etc. Now that the company has its own foundry, it is provided with metal flasks and the latest style of equipment for all the principal jobs. This foundry was designed by the H. M. Lane Company of Detroit, Mich.



Details of the Steam-Heated Core Oven

The Standard Steel Castings Company, Cleveland, Ohio, will open an office at room 1814, 30 Church Street, New York, Oct. 1, in charge of E. P. Harris as agent.

RAILROAD SPECIAL STEELS

Their Use in the United States for Rails and in Other Service

The last Bulletin of the American Railway Engineering Association issued from the association's headquarters, 900 South Michigan Avenue, Chicago, contains an elaborate report on "Special Steel" as used by railroads, both in track and for track appliances as points, crossings, etc., prepared by W. C. Cushing, chief engineer maintenance of way, Pennsylvania Lines. Mr. Cushing had been selected as "reporter" for the United States on this subject to the International Railway Congress, which was to have been held at Berlin in 1915. His report takes up 193 pages of the current Bulletin and reviews at length all the developments in the use of special steel by railroads in the past three years. Its publication in this way is in view of the breaking up by the war of the organization of the general secretary of the congress at Brussels. Mr. Cushing's conclusions are given in seven paragraphs as follows:

1. Cast manganese steel has been proved by long experience, under exacting conditions, to be a satisfactory and safe metal for the manufacture of frogs and switch-points.

2. The trials of rolled manganese steel for rails, and for the manufacture of frogs and switches have not been so extensive as with the cast product, but have been continued to a sufficient degree to enable us to conclude that it will ultimately be entirely suitable for those uses at locations where great strength, toughness and a maximum abrasive resistance are desirable.

3. The experiments with nickel, and nickel and chromium in certain proportions, in rail steel have not, up to the present time, been entirely satisfactory; but the accepted employment of nickel steel in bridge construction, and the trials of nickel and chromium in other proportions in rail steel, especially when incorporated as two of the natural elements of the iron ore, justify continued use.

4. The use of high carbon (over 0.80 per cent.) in rails weighing 85 lb. per yd., in combination with 0.92 to 1.00 per cent of nickel, and 0.24 to 0.29 per cent of chromium, has not been satisfactory. The conditions with rail sections of greater weight might be entirely different.

5. Further study of the qualities possessed by high silicon rails, that is, steel with over 0.30 per cent of silicon, is advisable.

6. The value of the use of ferrotitanium in rail steel manufacture as a "physic" for improving the condition of solidity of the metal is conceded, but at the same time steps should be taken to overcome its injurious effect in deepening the "pipe" in the ingot.

7. Heat-treated rails and these manufactured with the assistance of the electric process are at present in experimental use only, but the possibility of future value is promising and the study should be continued.

The résumé concerning manganese steel for rails, more expanded than is given in paragraph 2 above, is as follows:

The use of manganese steel rails is not well established like that of manganese steel frogs and switches, but it is still being tried in especially difficult locations, and will in all probability meet with greater favor among railroad engineers when some of the objections have been removed. The principal faults found with them at the present time are:

1. A number of breakages has been recorded, which is disquieting. The ordinary rolled carbon steel shapes are difficult to reproduce in manganese steel, on account of the trouble in quenching the metal without the formation of minute cracks, which may subsequently cause fracture.

2. It is strong and tough, but the hardness is not superior to that of Bessemer steel, and consequently the resistance to battering at the ends of the rails is not altogether satisfactory. Measurements to show this have been made by the Atchison, Topeka & Santa Fé Railway system engineers. The maximum joint depression or "set" recorded by them up to the present time seems to be 0.10 in., after three years and two months service.

3. The present primary cost, about $90 per ton of 2240 lb., is so high that, although the resistance to wheel flange abrasion on curves is very great, greater than any other metal tried, the resulting economy is not sufficiently great to be attractive to the railroad administrations. It is hoped that additional knowledge and skill in manufacture will overcome this, because the price has already been reduced from $180 per ton. This high price was, of course, partly due to the very small quantities produced, and the lack of suitable manufacturing facilities.

4. It is impossible to drill or cut it in the field, on account of its great toughness. It is beyond the reach of present tools.

Stuebing Truck for Industrial Plants

The lifting truck, a comparatively new factory appliance, has eliminated a large percentage of the time lost in loading and unloading hand trucks. The lifting truck system comprises, of course, the use of a master lift truck in conjunction with inexpensive platforms.

The Three-Wheel Stuebing Industrial Truck

These loading platforms are set on the floor where needed, and when ready to be moved, the master, or lifting truck, is run underneath the platform and lifts it from the floor.

The accompanying illustration shows the operating handle or lever of a truck built by the Stuebing Truck Company, Cincinnati, Ohio. It is fitted with a hook which engages a hook on the lifting frame. When the lever is pulled down to its lowest point a locking pawl engages the platform locking hook and the load is then independent of the lever, and by throwing up the lever hook the handle is entirely free. With this model no hydraulic check is employed for lowering the load, which is done by connecting the lever hook with the platform hook, bringing the lever to the low point, and pressure on the lever will permit the small handle at the side of the truck head to be lifted. This disconnects the locking means and the load is lowered under full control of the operator. This compulsory control obviates the chance of accidents from lowering the load too quickly. The lifting frame has beveled blocks that slide on an incline on the body of the truck, and these inclines are lubricated to minimize the friction.

A 4-wheel truck is built along the same lines as the 3-wheel one described, except that this truck is fitted with a hydraulic check for lowering the load. Both of the models are made in different sizes with lifting capacities ranging from 2000 to 8000 lb. Hyatt roller bearings are used.

The United Steel Company, Canton, Ohio, will build its new open-hearth furnaces with the Orth reinforced roof. The Youngstown Sheet & Tube Company has also adopted this construction for all of its furnaces.

Foundrymen's Conventions in Atlantic City

Meetings on Iron, Steel and Non-Ferrous Foundry Subjects and the Exhibition of Foundry Equipment, Machinery and Supplies

The annual gathering of those identified with the foundry industry takes place this year at Atlantic City, N. J. The American Foundrymen's Association and the American Institute of Metals—the one devoted to iron and steel and the other to non-ferrous metals and their alloys—will hold their annual meetings simultaneously, and also as usual there will be the exhibition of foundry apparatus and supplies conducted by the Foundry & Machine Exhibition Company. The exhibition will be held on Young's Million Dollar Pier and will open on Saturday, Sept. 25. The meetings of the two technical societies will begin on Tuesday, Sept. 28, and all will come to a close on Friday, Oct. 1. As has been the case before, the conventions serve to mark what progress has been made in the year, both in the science and in the art of founding and, to a degree, of metal working.

The programs have already been published in these columns and have been favorably commented on in respect to the scope of subjects and the specific character of treatment in some cases, as may be judged from titles. The extent of the activities of what is coming to be known as Foundry Week may meanwhile be indicated by the accompanying tabulation of the various sessions. Much interest will also naturally surround the exhibition. For some years this has been more than notable in the amount of buying done, and not only will the extent of the business transacted be watched because of this being used as a measure of business revival (discounting such as may seem to be directly due to the so-called war business), but the possibility of noticeable buying for foreign account will receive consideration as a promise of a widening market. Present indications are that machine shop equipment will not be strongly represented, due altogether to the heavily booked condition of plants of most machine builders, who have few spare products for display purposes, let alone the time for arranging them.

The exhibition will be the tenth annual affair of the kind. The convention of the American Foundrymen's Association will be its twentieth annual, while that of the American Institute of Metals will be the ninth annual meeting since its branching as a separate identity from the American Foundrymen's Association. It is interesting that the first meeting of the American Foundrymen's Association was held in Philadelphia in 1896, and it was not until 1902 that the annual meeting was held as far east. Then the convention took place in Boston. The meeting of 1905 was held in New York City, when the late Thomas D. West was president, and

Condensed Program of Foundry Week

Saturday, Sept. 25.

10:00 a. m.—Opening of the exhibition on Young's pier.

Monday, Sept. 27.

10:00 a. m.—Registration, Young's pier.

8:00 p. m.—Informal dance, Young's pier.

Tuesday, Sept. 28.

10:00 a. m.—JOINT SESSION, American Foundrymen's Association and American Institute of Metals, Convention Hall, Young's pier. Address of welcome, reports on safety and industrial education and papers on sand, etc.

2:00 p.m.—SESSION on GENERAL PAPERS, American Institute of Metals, Hotel Traymore.

2:30 p.m.—SESSION on GENERAL PAPERS, including molding machines, management, etc., American Foundrymen's Association, Convention Hall, Young's pier.

8:00 p. m.—Theater party.

Wednesday, Sept. 29.

10:00 a. m.—Session on GENERAL PAPERS, American Foundrymen's Association, Convention Hall, Young's pier.

10:00 a. m.—Session on GENERAL PAPERS, American Institute of Metals, Hotel Traymore.

2:00 p. m.—Session on ALUMINUM and ALUMINUM ALLOYS, American Institute of Metals, Hotel Traymore.

2:30 p. m.—Session on GRAY IRON CASTINGS, American Foundrymen's Association, Convention Hall, Young's pier.

8:00 p. m.—Annual business sessions, American Foundrymen's Association and the American Institute of Metals, Hotel Traymore.

Thursday, Sept. 30.

10:00 a. m.—STEEL CASTING SESSIONS, American Foundrymen's Association, Convention Hall, Young's pier.

10:00 a. m.—MALLEABLE CASTING SESSION, American Foundrymen's Association, Annex to Convention Hall, Young's pier.

10:00 a. m.—SESSION on ACID METALS and BEARING BRONZES, American Institute of Metals, Hotel Traymore.

2:00 p. m.—SESSION on FORGING and ROLLING ALLOYS, American Institute of Metals, Hotel Traymore.

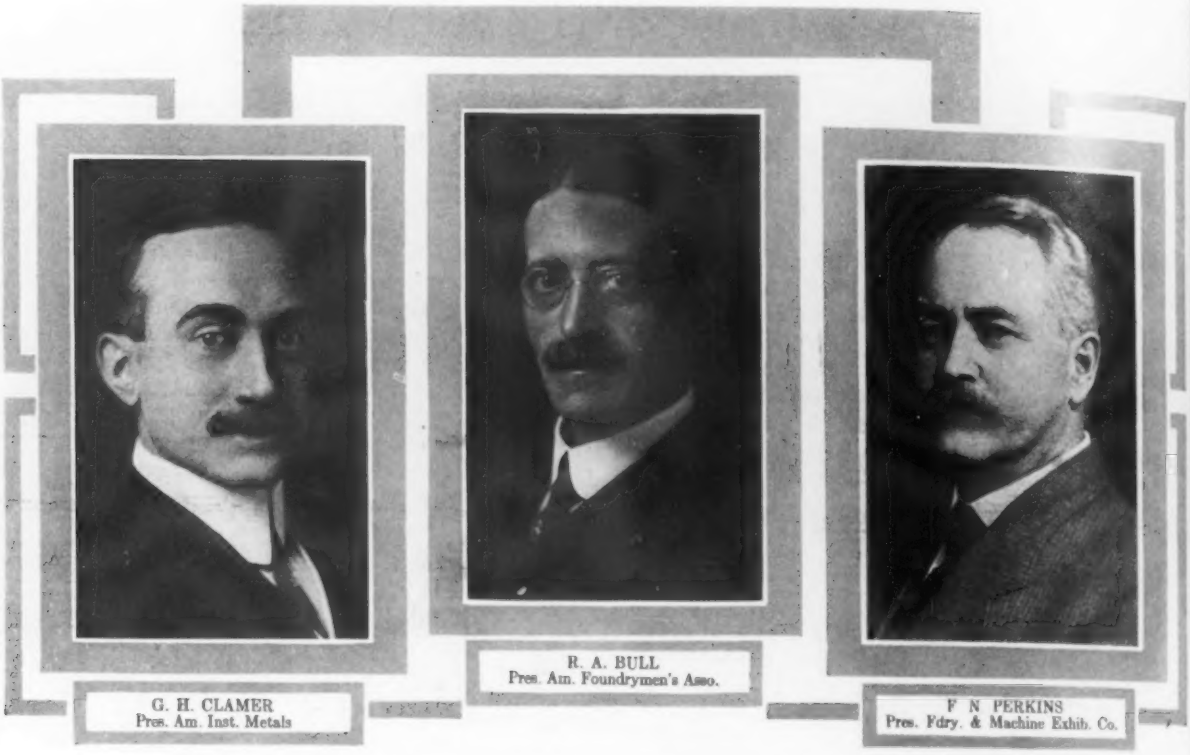
2:30 p. m.—SESSIONS on STEEL AND MALLEABLE CASTING PRACTICE, continuing respective sessions of the morning, American Foundrymen's Association.

7:00 p. m.—Annual banquet, Hotel Traymore.

Friday, Oct. 1.

10:00 a. m.—CLOSING BUSINESS SESSION, American Foundrymen's Association, Convention Hall, Young's pier.

6:00 p. m.—Exhibition closes.



PRESIDENTS OF THE THREE ASSOCIATIONS PARTICIPATING IN FOUNDRY WEEK

the only other meeting held east of Buffalo or Pittsburgh was in 1907 in Philadelphia, with Stanley G. Flagg, Jr., president.

Besides the condensed program of the association meetings, which this year have, for example, required three simultaneous sessions on both Thursday morning and afternoon, the present announcement contains in the following pages a list in detail of the exhibitors and exhibits at the exposition; a map of the exhibit spaces on the Million Dollar Pier, with alphabetical and numerical finding lists; portraits of the presidents and secretaries of the three organizations in charge, and portraits of vice-presidents of the American Foundrymen's Association.

It may be added that for the banquet of Thursday evening, Sept. 30, two notable speakers are announced: Dr. John A. Brashear, accredited Pennsylvania's foremost citizen, who is to recount "Personal Reminiscences of Fifty Years' Development in Mechanical Science," and John Kendrick Bangs, who is to tell of "Salubrities I have Met."

Finally, as regards attractions not confined to the meeting room or the exhibition, may be mentioned arrangements made for plant visitation in Philadelphia and surrounding towns. Harold W. Brown, Tabor Mfg. Company, Philadelphia, is chairman of committee in charge, which includes representatives of foundries, machine shops, iron and steel works and other industrial establishments in Philadelphia, Chester, Coatesville, Newcastle, Del., and Pottstown.

Exhibitors and the Products Displayed

Ajax Metal Company, Philadelphia, Pa.—Display of ingot metals and castings made from them. Represented by G. H. Clamer, William J. Coane, C. F. Hopkins, H. L. Carpenter, Jr., A. MacDougall and F. M. Willeson.

Arcade Mfg. Company, Freeport, Ill.—Working display of Norcross jolting machine, Modern molding machine, hand squeezers, air squeezers, combined jolting and squeezing machines, power roll-over jolt pattern drawing machine, core jolters, sand sifters, and Brillion pouring devices.

E. C. Atkins & Co., Indianapolis, Ind.—Metal-cutting saws for all purposes, Atkins high speed Kwik Kut hack saw machines operating on various kinds of materials. Represented by Elmer Heidlinger, E. W. Clark and W. L. Timpone.

Ayer & Lord Tie Company, Chicago, Ill.—Demonstration of creosoted wood blocks for interior floor service. Represented by A. H. Noyes, W. H. Blythe, B. S. McConnell and E. L. Parvin.

Jonathan Bartley Crucible Company, Trenton, N. J.—Crucibles made from American clays, both unused and those which have given satisfaction equal to those formerly made from German clay.

Berkshire Mfg. Company, Cleveland, Ohio—Berkshire automatic molding machine, air squeezer and Acme core machine. Represented by W. D. Fraser, F. Hulec and G. L. Cannon.

Charles H. Besly & Co., Chicago, Ill.—Several Besly grinders under power, including a 53-in. vertical spindle gravity feed grinder for facing or jointing metal foundry flasks; a 30-in. patternmaker's grinder and a 26-in. direct-connected motor-driven grinder for flat surface grinding of all metals. Represented by Edward P. Welles, Charles A. Knill and William H. Allen and several demonstrators.

S. Birkenstein & Sons, Chicago, Ill.—Line of metals, particularly the products of the Globe Metal Company, manufacturer of ingot brass and other metals for the brass and aluminum foundries. Represented by H. Birkenstein, Lee Kahn, J. W. Long and E. J. Schwab.

Blystone Mfg. Company, Cambridge Springs, Pa.—Blystone core sand and facing mixer. Newly designed low-charging mixer with rotary screen to be shown for the first time.

Brown Specialty Machinery Company, Chicago, Ill.—Hammer core machines of 3-in., 5-in. and 7-in. round core capacities; electric and pneumatic duplex shakers and two sizes of revolving barrel sandblast machines. Represented by H. P. Furlong, John Laycock, R. L. Laycock and E. A. Rich.

A. Buch's Sons Company, Bridgeport, Pa.—Electric jar and squeeze, hand and foot power machines, floor flasks, snap flasks and a general line of foundry equipment. Represented by R. S. Buch, J. E. Buch and G. E. Bates.

Buckeye Products Company, Cincinnati, Ohio—Electric riddles, vibrators, high temperature cements, parting and fluxing compounds, etc.; machinery in operation. Represented by C. J. Goehringer, J. B. Carpenter, A. J. Johnson, B. Bernbaum, C. S. Weigert and R. B. Ferguson.

SECRETARIES OF THE THREE ASSOCIATIONS PARTICIPA TING IN FOUNDRY WEEK

Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxite wheels for grinding cast iron, brass, bronze, aluminum, steel and malleable castings; also metallic silicon, carborundum fire sand, carborundum paper and cloth. Represented by George R. Rayner.

Cataract Refining & Mfg. Company, Buffalo, N. Y.—Foundry core oils, parting, cutting compounds, drawing compounds and samples of work done with them. Represented by H. C. Hutchins, R. J. Collins, J. Purvis, F. E. Hill, J. E. Chism, F. M. Edwards, A. A. Schaefer and L. C. Smith.

George P. Clark Company, Windsor Locks, Conn.—Transfer trucks, rubber and iron wheel casters and wheels.

Charles J. Clark, Chicago, Ill.—Clark meter for measuring the volume of blast supplied cupolas and other furnaces. Represented by Charles J. Clark.

Clark Foundry Company, Rumford, Me.—Combined punch and shear. Represented by P. B. Clark and S. J. Gonya.

Clearfield Machine Shops, Clearfield, Pa.—Working model of a 50,000-lb. 8-ft. wet pan type machine chiefly used for mixing and tempering ores, clays, foundry sand and other materials. Represented by P. B. Reed.

Cleveland Pneumatic Tool Company, Cleveland, Ohio—Cleveland air tools, including riveting and chipping tools, air drills, valve grinders, emery grinders, bench and center grinders, corner drills, compound drills, sand rammers, core breakers, Bowes air hose couplings, etc. Represented by H. S. Covey, Arthur Scott, J. A. Day, G. Gregory and F. E. Schwarze.

Clipper Belt Lacer Company, Grand Rapids, Mich.—Clipper belt lacer and hooks; the lacer a small portable tool which can be taken to the belt to be laced.

Thomas E. Coale Lumber Company, Philadelphia, Pa.—White pine pattern and flask lumber, also mahogany pattern lumber.

Joseph Dixon Crucible Company, Jersey City, N. J.—Graphite crucibles, sand crucibles, cupels, stoppers, nozzles, sleeves, phosphorizers and other refractory products. Represented by Frank J. Krug, A. L. Hassis, R. F. Leonard, H. C. Sorenson, Malcolm McNaughton and George Neighbor.

Felt & Tarrant Mfg. Company, Chicago, Ill.—Comptometer adding and calculating machine, fitted with a new automatic device designed to insure accuracy of operation. Represented by J. G. Klees and assistants.

Foundry Manganese Company, Philadelphia, Pa.—Ferromanganese and ferrosilicon for foundry use.

Gardner Governor Company, Quincy, Ill.—Steam and power pumps, vertical and horizontal air compressors, steam engine governors, steam separators and vacuum pumps.

Gardner Machine Company, Beloit, Wis.—Display of fourteen types of grinding and polishing machines, including horizontal disk grinders, single and double-head disk grinders, band polishing machines, ball bearing buffing lathes, pattern making machines and new special equipment. Represented by L. Waldo Thompson, Walter B. Leishman, John M. Gardner, A. A. Swinnerton, H. M. Shaw, William Townsend and Dale C. Graves.

General Electric Company, Schenectady, N. Y.—Arc welding equipment, motors with brakes and controllers, centrifugal compressor, replica of crane cab and various electric appliances. Represented by J. A. Seede, R. H. McLain, L. W. Shugg, of Schenectady, and J. A. Boers and G. P. Mills, of Philadelphia.

Goldschmidt Thermit Company, New York—Carbonfree metals and alloys produced by the Thermit process, foundry cans for use in reviving dull iron and steel in the ladle; actual demonstration of the Thermit process in pipe welding. Represented by William Aldrich, J. G. McCarty, H. G. Spilsbury, H. D. Kelley and De Courcy B. Browne.

Graceton Coke Company, Graceton, Pa.—Specimens of 72-hr. foundry coke.

Great Western Mfg. Company, Leavenworth, Kan.—Combs gyratory foundry riddles. Represented by George W. Combs and F. A. Pickett.

F. A. Hardy & Co., New York—Hardy welding glass with Noviweld lenses, safety glasses and eye protectors. Represented by W. B. Gosman.

Hayward Company, New York—Electric motor clam shell bucket, Midget derrick and two-line clam shell and drag scraper buckets. Represented by H. M. Davison, H. S. Atkinson and C. F. Hutchings.

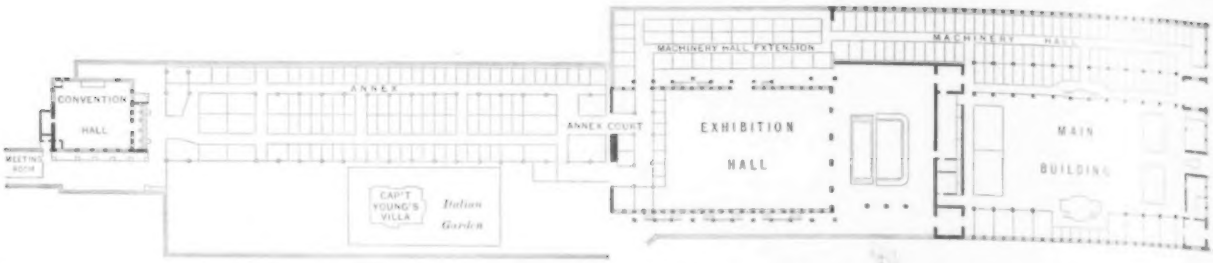
Herman Pneumatic Machine Company, Zelienople, Pa.—Herman independent turnover and pattern drawing device, combination jar squeeze stripper in operation; portable jar stripper machine making both copes and drags; small plain jar machines and core machines, showing the jarring principle applied to the production of cores and small molds. Represented by A. M. Frauenheim, Alfred Herman, Thomas Kaveny, M. L. Heyl, R. F. Ringle, A. Rodgers, Alfred McWithey, demonstrator, and Joseph Larson, erector.

Herold Bros. Company, Cleveland, Ohio—Electra-Weld wire wheel brushes and various brushes for foundry use. Represented by L. T. Herold and K. G. Herold.

Hill & Griffith Company, Cincinnati, Ohio—Booth. Represented by William Oberhelman, J. M. Glass, James A. Carey and F. McCarthy.

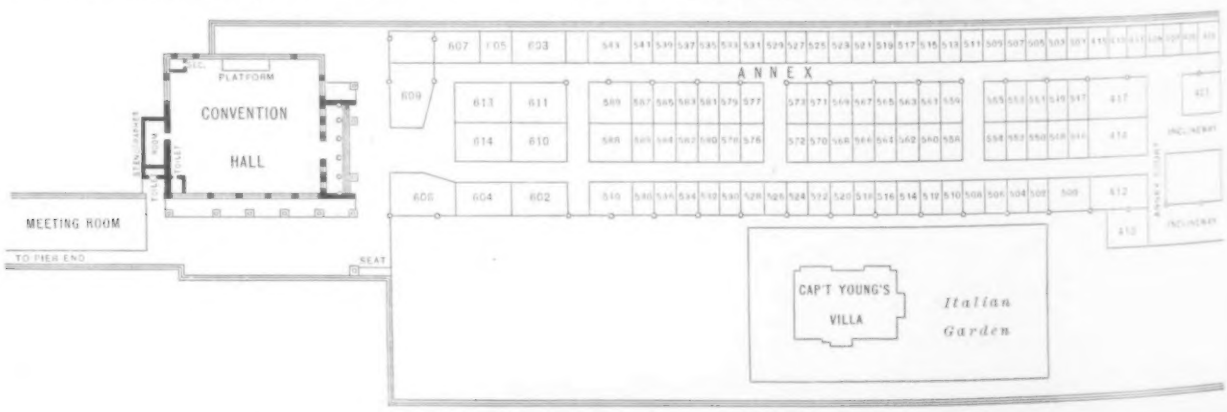
Ingersoll-Rand Company, New York—Imperial Type XB-2 duplex electrically driven two-stage air compressor of 446 cu. ft. capacity and Ingersoll-Rogler, Class FR-1, straight line steam-driven compressor of 335 cu. ft. capacity. Both machines will compress to 100 lb. Line of compressed air operated wood borers and metal drills, of the Little David type, designed for drilling, reaming, tapping, flue rolling and wood boring. Also shown will be Little David close quarter drills, portable grinders and Little David riveters and chippers; Imperial hoists and air operated sand rammers.

International Steam Pump Company, New York—Deane sand riddler, Blake-Knowles Climax core wire straight-



GENERAL PLAN OF YOUNG'S PIER, ATLANTIC CITY

Alphabetical List Giving Location of Exhibitors



WATER END OF PIER: CONVENTION HALL, ANNEX AND ANNEX COURT

Finding List of Exhibitors According to Numbers of Exhibit Spaces

Main Building

1 THE IRON AGE
[illegible] Railway Age Gazette
[illegible] Rogers, Brown & Co.

Machinery Hall

99 International Steam Pump Company
102 Cleveland Automatic Machine Company
103 Landis Tool Company
105 Union Steam Pump Company
107 Same as 105
108 McCrosky Reamer Company
109 Clark Foundry Company
110 Norma Company of America
111 Herman Pneumatic Machine Company
112 Electric Controller & Mfg. Company
113 Same as 111
115 Same as 111
117 Westinghouse Electric & Mfg. Company
118 Cleveland Pneumatic Machine Company
119 Henry E. Pridmore
120 Same as 118
121 Same as 119
123 Same as 119
124 Osborn Mfg. Company
125 Same as 119
126 Same as 124
127 Same as 119
128 Same as 124
129 National Engineering Company
130 Same as 124
131 E. H. Mumford Company
132 Same as 124
133 Same as 131
134 Same as 124
135 Same as 131
136 Berkshire Mfg. Company
137 Great Western Mfg. Company
138 Same as 136
139 Same as 137
140 Same as 136
141 International Molding Machine Company
142 Ingersoll-Rand Company
143 Same as 141
144 Same as 142
145 Same as 141
147 Same as 141
148 Charles H. Besly & Co.
149 Arcade Mfg. Company
150 Same as 148
151 Same as 149
152 Cataract Refining & Mfg. Company
153 Same as 149
154 Same as 152
155 Same as 149
156 Sand Mixing Machine Company
157 Same as 149
158 Same as 156
159 Buch Foundry Equipment Company
160 Same as 156
161 Same as 159
162 Same as 156
163 Same as 159
164 Norton Company
165 Same as 159
166 Same as 164
167 General Electric Company
168 Midland Machine Company
169 Same as 167
170 Mumford Molding Machine Company
171 Same as 167
173 Same as 167
183 Clipper Belt Lacer Company

Machinery Hall Extension

201 Snyder Electric Furnace Company
202 Snyder Electric Furnace Company
203 Snyder Electric Furnace Company
204 Snyder Electric Furnace Company
205 Snyder Electric Furnace Company
206 Snyder Electric Furnace Company
207 Tabor Mfg. Company.
208 Ready Tool Company
209 Same as 207
210 Same as 207
211 Same as 207
212 Same as 207
213 Same as 207
214 Same as 207
215 Same as 207
216 Same as 207
217 Gardner Machine Company
218 Gardner Machine Company
219 Gardner Machine Company
220 Gardner Machine Company
222 Lincoln Electric Company
223 Standard Sand & Machine Company
224 Mott Sandblast Mfg. Company
225 Mott Sandblast Mfg. Company
227 Pangborn Corporation
228 Pangborn Corporation
229 Pangborn Corporation
230 Pangborn Corporation

Exhibition Hall

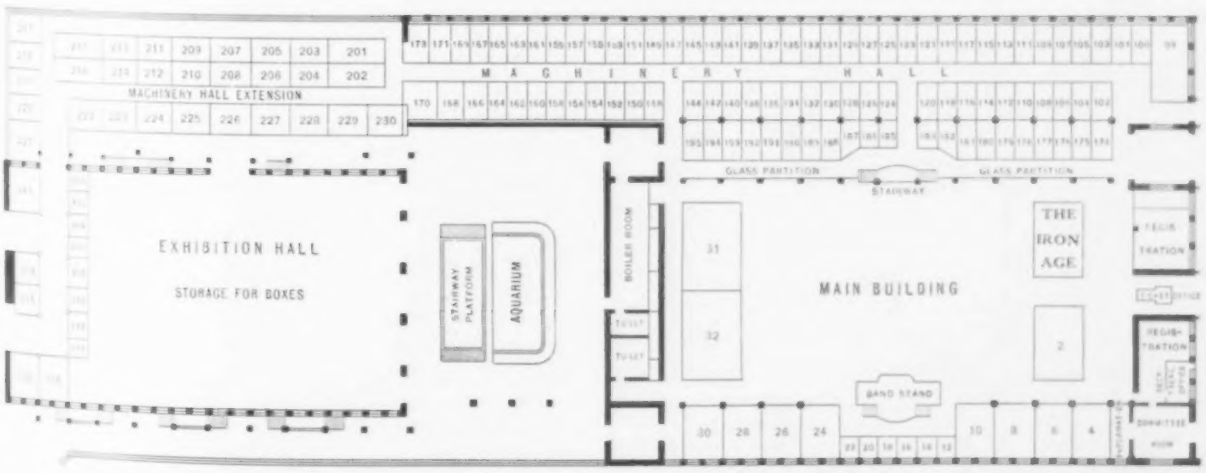
300 Clearfield Machine Shops
302 Strong, Kennard & Nutt Company
304 E. C. Atkins & Co.
341 Sullivan Machinery Company and C. J. Clark

Annex Court

401 Pickands, Brown & Co.
409 S. Obermayer Company
411 Rock Island Mfg. Company
412 Sterling Wheelbarrow Company
413 Buckeye Products Company
414 J. W. Paxson Company
417 Penton Publishing Company

Annex

500 Monarch Engineering & Mfg. Company
501 Richey, Browne & Donald
502 David Lupton's Sons Company
503 Herold Brothers Company
504 Jennison-Wright Company
506 Hill & Griffith Company
508 Robeson Process Company
509 Oxweld Acetylene Company
510 Same as 508
511 Same as 509
514 Blystone Mfg. Company
515 Waterbury Welding Company
521 Thomas E. Coale Lumber Company
523 *Iron Tradesman*
524 Wyoming Shovel Company
525 Same as 523
526 U. S. Graphite Company
527 Same as 523
531 Foundry Manganese Company
536 F. A. Hardy & Co.
539 McLean Publishing Company
540 Ajax Metal Company
541 McLeod Company, W. F. Stodder
543 *Factory*
546 Thomas Iron Company
547 R. P. Smith & Sons
548 Julius King Optical Company
552 T. B. Wood's Sons Company
553 Cowan Truck Company
554 J. S. McCormick Company
555 Ayer & Lord Tie Company
558 New Haven Sandblast Mfg. Company
560 Gardner Governor Company
560 New Haven Sandblast Mfg. Company
561 Malleable Iron Fittings Company
566 Carborundum Company
567 Carborundum Company
572 S. Birkenstein & Sons
573 Felt & Tarrant Mfg. Company
576 T. A. Willson & Co.
577 W. W. Sly Mfg. Company
578 Hunter Saw & Machine Company
586 Goldschmidt Thermit Company
587 White & Brother, Inc.
588 Titanium Alloy Mfg. Company
589 Jos. Dixon Crucible Company
602 Brown Specialty Machinery Company
604 Graceton Coke Company
607 Lehigh Coke Company
609 Whiting Foundry Equipment Company
610 Hayward Company
611 Shepard Electric Crane & Hoist Company
614 E. J. Woodison Company



LAND END OF PIER: EXHIBITION HALL, MACHINERY HALL AND MAIN BUILDING

ener and the Laidlaw Dunn Gordon Feather Valve air compressor.

International Molding Machine Company, Chicago, Ill.—Complete line of turn-over, jarring, squeezer, combination and core machines. Represented by Edward A. Pridmore, W. W. Miller, J. W. Dopp and F. W. Hamel.

Jennison-Wright Company, Toledo, Ohio—Sections of Kreolite wood lug block floors for machine shops and factories, blocks for loading platforms, etc.; Kreolite treated structural timbers, etc.; photographs of installations. Represented by H. G. Jennison, L. P. Drinker, F. E. Jennison, Frank B. Goodman and Isaac Wright.

Julius King Optical Company, New York—Demonstration of Saniglas and Isafe eye protectors, Litesafe and Dustsafe goggles, Bowers patent Arkweld helmet, King's patent babbitting mask; and the spectrum projector for demonstrating the value of scientifically correct colored lenses for industrial use. Represented by Walter G. King, Frederick W. King, Samuel P. Ward and Edmund Herold.

Landis Tool Company, Waynesboro, Pa.—One 12 x 36 grinder. Represented by T. H. King.

Lehigh Coke Company, South Bethlehem, Pa.—Photographs showing the manufacture of by-product coke, as well as a representation of what is obtained in the way of sulphate of ammonia, tar, gas, benzol, toluol, xylol, solvent naphtha, etc. Represented by D. A. Barkley.

Lincoln Electric Company, Cleveland, Ohio—Single operator arc welding machines in operation. Represented by Robert E. Kinkead.

Macleod Company, Cincinnati, Ohio—Sand-blast machine, sprayers for blacking molds, and oxy-acetylene welding and cutting torch. Represented by W. F. Stodder.

J. S. McCormick Company, Pittsburgh, Pa.—Core and facing sand mixer, general foundry supplies. Represented by J. S. McCormick, T. E. Malone and S. R. Costley.

Mahr Mfg. Company, Minneapolis, Minn—Mahr portable foundry, boiler shop and rivet torches, and core oven burners, most of which will be in operation. Represented by J. A. Mahr, J. E. Chamberlin and H. H. Warner.

Malleable Iron Fittings Company, Branford, Conn.—Working models of the Branford hardened steel vibrator. Represented by George B. Pickop.

Midland Machine Company, Detroit, Mich.—Jolt roll-over molding machine with lifting capacity of 1000 lb., also hand roll-over machine, and a device which can be attached to any standard make of reciprocating riddle to increase its capacity. Represented by George L. Grimes and C. J. Skeffington.

Monarch Engineering & Mfg. Company, Baltimore, Md.—Foundry melting furnaces, heat treating furnaces, core ovens, portable heaters, pumps, blowers, etc. Furnaces equipped for all fuels. Represented by J. J. Allen, M. W. Woodburn and H. D. Harvey.

Mott Sand Blast Mfg. Company, New York—Direct pressure sand-blast machine, also a new type of direct pressure sand-blast barrel. Demonstrations of cleaning castings. Represented by David Mayer, E. J. Rosenthal, F. J. Hull, George D. Fletcher and Edward Kies.

E. H. Mumford Company, Elizabeth, N. J.—Plain jolt and core bench jolt rammers, pit pattern draft machines, plain squeezers, plain split pattern machines, combination jolt and squeeze ramming machines, high trunnion squeezers, etc. Represented by T. J. Mumford.

National Engineering Company, Chicago, Ill.—Core sand and facing mixture in operation. Represented by P. L. Simpson.

New Haven Sand-Blast Company, New Haven, Conn.—Sand-blast rolling barrels and hose-type sand-blast machines. Represented by C. E. Billings and Charles S. Johnson.

Norma Company of America, New York—Precision ball, roller, thrust and combination anti-friction bearings. Represented by O. P. Wilson, J. T. R. Bell, E. A. Perkins and G. R. Bott.

Norton Company, Worcester, Mass.—Grinding machines, including a 1¼-in. Norton Model D bench stand; 1¼-in. Model C bench stand, both in operation; a 1¾-in. Model D floor stand, and a display of Alundum and Crystolon grinding wheels. Represented by R. G. Williams, Carl F. Dietz, S. A. Craig, Oscar E. Nordstrom and George S. Welker.

S. Obermayer Company, Chicago, Ill.—Booth. Represented by S. T. Johnston, E. D. Frohman, C. M. Goldman, W. M. Fitzpatrick, F. H. Dodge, J. J. McDevitt.

Osborn Mfg. Company, Cleveland, Ohio—Working exhibit of molding machines, including the split pattern, jolt and plain squeezers with sand straddle base, jolt ramming machines for making cores, small roll-over machines, roll-over hand jolts, roll-over rock down and rock over drop draft machines. A feature will be a 42-in. electrically operated direct draw roll-over jolt machine. Represented by H. R. Atwater, E. T. Doddridge, J. H. Galloway, E. W. Jacobi, M. W. Zeman, F. B. Atwood, Paul E. Ryan and E. S. Carman.

Oxweld Acetylene Company, Chicago, Ill.—Oxweld cutting and welding apparatus, portable and stationary types, welding supplies, etc. Demonstrations of cutting and welding various metals.

Pangborn Corporation, Hagerstown, Md.—Extensive exhibit of the various types of sand-blasts and kindred equipment in operation. Among the castings to be sand-blasted will be those made at the show from metal melted in the Snyder electric furnace.

J. W. Paxson Company, Philadelphia, Pa.—Sand-blast cleaning room equipment; molding sands and foundry facings; blue prints and photographs of sand-blast plants, machines, sand separators, suction and bucket elevators, sand and dust collectors, etc. Over 500 photographs will be shown of foundry equipment, sand farms, clay pits, etc. Represented by H. M. Bougher, J. S. Hibbs, I. F. Kremer, E. M. Taggart, J. B. Ellis, F. J. Zippler.

Pickands, Brown & Co., Chicago, Ill.—Display of Solvay coke in the form of the Liberty Bell, about 12-ft. high and of proportionate width. Represented by George A. T. Long, Thomas W. Glasscot, Bayard T. Bacon and James A. Galligan.

Henry E. Pridmore, Inc., Chicago, Ill.—Stripping plate, hand rock-over drop, power rock-over drop, squeezer, plain electric and combination jarring machines, some of which contain new features. Represented by Mrs. E. M. Pridmore, H. A. Pridmore, D. F. Eagan, C. H. Ellis and A. V. Magnuson.

Ready Tool Company, Bridgeport, Conn.—High speed tool holders, including new style chrome nickel lathe tools, shaper and planer tools, improved boring bar; milling machine, lathe and grinder dogs; Safety First belt stick, and laminated steelite tools for shrapnel work. Represented by Harold Fish.

Richey, Browne & Donald, Maspeth, N. Y.—Roller ramming machine, molding machine and sand-handling appliance, exhibited under the name of The Moldar Company. Represented by Walter H. Hofmann and E. Foster Babbitt.

Robeson Process Company, New York—Samples of Glutrin core binder, with illustrations of its use. Represented by George N. Moore, T. J. Ryan and R. S. Hughes.

Rock Island Mfg. Company, Rock Island, Ill. Hand and foot power grinders, vises, drop hangers, etc. Represented by O. J. Shields, John H. Graham & Co. and C. E. Shields.

Rogers, Brown & Co., Cincinnati, Ohio—Motion Pictures—From Mine to Molder, daily at 2.30 p. m. These pictures, which are repeated in response to numerous requests, graphically portray all operations from mining ore to finishing a steel rail. Represented by A. A. Fowler, F. W. Bauer, T. A. Wilson, A. O. Sonne, L. C. Calkins, Cecil Bertie, George R. Sullivan, F. J. Waldo, F. E. Fitts, Otto Arlt, R. W. Clark, J. A. Claussen and Standish Meacham.

Sand Mixing Machine Company, New York—Sand cutting machine which is self-propelled and driven about the foundry wherever work is to be done. Represented by V. E. Minich, William A. Heartt, Hutton H. Haley, John Bradley, Charles L. Benham and David Logan.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.—Illustrations of the various types of machinery of the company's manufacture. Represented by F. A. Hatch, H. W. Gledhill and R. H. McGredy.

R. P. Smith & Sons Company, Chicago, Ill.—Protec-toe safety congress shoes for molders and foundrymen. Represented by J. B. Smith, Jr.

Snyder Electric Furnace Company, Chicago, Ill.—Snyder electric furnace of regular commercial type, melting and refining steel and pouring into hand ladles for the production of castings. The castings will be cleaned and machined in nearby booths and tested in Philadelphia. Represented by F. T. Snyder, C. H. Booth, F. J. Ryan and W. D. Walker.

Standard Sand & Machine Company, Cleveland, Ohio—One No. O-A Standard core and facing sand mixing machine, motor-driven, in operation; one No. 1 machine of the same type not in operation and one Standard core pulverizing machine, not in operation. Represented by H. G. Boughton and Harry E. Boughton.

Sterling Wheelbarrow Company, West Allis, Wis.—Rolled steel flasks, snap flasks, wheelbarrows, trucks, foundry wedges, skim gates, etc. Some new steel flasks will be shown for the first time. Represented by I. R. Smith, E. W. Dowd, George H. Lambkin, H. A. White and H. H. Baker.

W. F. Stodder, Syracuse, N. Y.—Cyclone suction sand-blast nozzle for all kinds of sand-blast work. Represented by W. F. Stodder, W. J. Van Zandt and M. A. Stodder.

Strong-Kennard & Nutt Company, Cleveland, Ohio—Complete line of protection glasses for chippers, grinders, welders and other industrial operatives. A feature will be a testing device to test the strength and efficiency of the gog-

WALTER WOOD
Vice-Pres. Am. Foundrymen's Asso.

H. E. FIELD
Vice-Pres. Am. Foundrymen's Asso.

H. A. CARPENTER
Vice-Pres. Am. Foundrymen's Asso.

J. P. PERO
Vice-Pres. Am. Foundrymen's Asso.

T. W. SHERIFFS
Vice-Pres. Am. Foundrymen's Asso.

S. B. CHADSEY
Vice-Pres. Am. Foundrymen's Asso.

J. J. WILSON
Vice-Pres. Am. Foundrymen's Asso.

A. T. DRYSDALE
Vice-Pres. Am. Foundrymen's Asso.

B. D. FULLER
Vice-Pres. Am. Foundrymen's Asso.

gles shown, while another device will be operated to show the value of colored glasses for welders. Represented by B. W. Nutt.

Sullivan Machinery Company, Chicago, Ill.—Sullivan, Class WJ 3 in. angle compound air compressor, with a capacity of 445 cu. ft. of free air per min., to supply air at 100 lb. pressure for exhibits. The machine will have short belt drive from a 75-hp. General Electric motor, at 225 r.p.m. of the compressor. Also photographs of Sullivan air compressors and of the Sullivan Machinery Company's iron foundry at Claremont, N. H. Represented by Arthur E. Blackwood, Ralph T. Stone and Chester G. Cummings.

Tabor Mfg. Company, Philadelphia, Pa.—An operating exhibit of shockless jarring machines, combination shockless jarring, roll-over and pattern drawing machines, both of the stationary and portable type, the latter being something new; plain power squeezers both stationary and portable, jarring squeezers and other molding machines. Also, Taylor-Newbold inserted tooth cold saw applied to a Newton cold-saw cut-off machine which will be in operation cutting bar stock. Represented by Wilfred Lewis, H. K. Hathaway, H. W. Brown, J. T. Ramsden, J. H. Coleman, H. W. Impey, D. J. Martin, Jacob Degler and two or three demonstrators.

Thomas Iron Company, Easton, Pa.—Pigs of sand-cast Thomas-Vanadium iron, specimens of small parts of machinery, small castings, cylinders, etc., as examples of strong and solid castings. Advertisements showing the results of three tests made for the company by the Mechanical Engineering Department of Lafayette College, Easton, Pa. Represented by Philip E. Wright, Willard Wright and E. Arthur Tutein.

Titanium Alloy Mfg. Company, Niagara Falls, N. Y.—Titanium treated samples, also samples of titanium, aluminum bronze and other brass and bronze castings made by the company. Represented by Messrs. Petinot, Harris and Hawley of the Ferro Carbon-Titanium department, and W. M. Corse, H. R. Corse and C. Vickers of the bronze foundry department.

Union Steam Pump Company, Battle Creek, Mich.—Several air compressors in operation, among which will be an 8 x 8 short belt drive compressor and an 8 x 8 x 8 steam-driven machine; large Burnham steam pump, small motor-driven centrifugal pump; also finished parts.

United States Graphite Company, Saginaw, Mich.—Booth. Represented by C. M. Williamson, Walter W. Lampkin, J. G. Drought and Frank B. Godard.

Waterbury Welding Company, Waterbury, Conn.—A. I. C. All-steel foundry riddles. Represented by F. C. Fromm.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.—A 500-ampere, 60-hp. arc welding set in operation. Also shown will be a number of examples of jobs that have been performed by this method of welding. Represented by R. F. Moon, H. C. Stier, W. H. Patterson, J. H. Bryan and H. W. Beaumont.

White & Brother, Inc., Philadelphia, Pa.—Various grades of ingot copper and brass; also castings made from the company's metals. Represented by John T. Fegley, Raymond Hunter, Wilbur Nixon, Joseph McLees, Howard Rennie and George Proctor.

Whiting Foundry & Equipment Company, Harvey, Ill.—Large wash drawings showing dust arresters, water cinder mills and sand-blast equipment; also a number of folios showing latest designs of foundry equipment and cranes, together with a large number of photographs illustrating recent installations. Represented by C. A. Hardy, R. H. Bourne and eastern representatives..

T. A. Willson & Co., Inc., Reading, Pa.—Various styles of industrial glasses, including the Willson safety glass with patented flange, designed to prevent the glass, when broken by accident, from passing backward toward the eye; also goggles with colored glasses. Represented by H. W. Davis and Gordon D. Richardson.

T. B. Wood's Sons Company, Chambersburg, Pa.—Equipment for the Wood system of taper snap molding comprising the Peerless taper snap flask and automatic adjustable snap jacket. Specimens of castings. Represented by Charles O. Wood, George M. Naylor and Victor Lesher.

E. J. Woodison Company, Detroit, Mich.—Automobile cylinders and castings used in cars made in Detroit in which Woodseed liquid core binder was used as a sand binder for the cores. Represented by E. J. Woodison, P. G. Smith and G. A. Burman.

Wyoming Shovel Works, Wyoming, Pa.—Wyoming Mayari Red Edge shovels and scoops as used in foundries. These are manufactured from Mayari steel which is a natural chrome-nickel composition. Represented by H. T. Potter and D. E. Geer.

Athol Machine Company, Athol, Mass.—Electrically driven and illuminated stand displaying vises, mechanics' fine tools, hack saw frames, hack saws, etc. Represented by Stephen E. French and H. K. Parkman.

David Lupton's Sons Company, Philadelphia, Pa.—Lupton steel sash, Pond continuous sash, operating device and truss, and Lupton steel partitions and steel tube doors. Represented by Clarke P. Pond, C. F. P. Buckwalter and L. F. Gieg.

Simonds Mfg. Company, Fitchburg, Mass.—Hack saw blades, files, circular metal saws (cold saws), and metal band saws. Demonstration of Simonds semi-high-speed steel metal cutting circular saws. Represented by J. E. Kelley.

W. W. Sly Mfg. Company, Cleveland, Ohio.—Demonstrations of a small sand-blast barrel, and dust arrester equipment. Pictures showing the company's various types of cleaning mill, sand-blast, dust arresters and core oven equipment. Represented by George J. Fanner, P. W. Grave and Alfred Anderson.

Cleveland Automatic Machine Company, Cleveland, Ohio.—Cleveland full automatic motor-driven machine specially suitable for all around screw machine work where a great variety of different parts are wanted in small or medium sized lots. Has push button control and may be operated with either 110 or 220 volt direct current. Represented by J. P. Brophy.

Mumford Molding Machine Company, Chicago, Ill.—Working model showing the parts of the company's jar ramming machine, and a new type of molding machine in operation. Represented by J. T. Lee, A. F. Jensen and D. M. Whyte.

Stuart American Products Company, Memphis, Tenn.—Fuel oil burner.

Second Pan-American Scientific Congress

A list of some of the committees which have been appointed in connection with the second Pan-American Scientific Congress, to be held in Washington, D. C., Dec. 27, 1915, to Jan. 8, 1916, has been received from Glen Levin Swiggett, assistant secretary-general of the congress. One of the nine sections of the congress is to be devoted to mining and metallurgy, economic geology and applied chemistry under the direction of Hennen Jennings, former president of the London Institution of Mining and Metallurgy, and there will be four sub-sections of this division, namely, mining, metallurgy, economic geology and applied chemistry. The personnel of the mining and metallurgy committees is as follows:

Sub-Committee on Mining

Van H. Manning, director United States Bureau of Mines, Washington, D. C., chairman.

J. F. Calbreath, secretary American Mining Congress, Washington, D. C.

Dr. C. H. Lindley, mining law, San Francisco.

E. W. Parker, statistician, Wilkes-Barre, Pa.

H. C. Perkins, mining engineer, Washington, D. C.

G. S. Rice, chief mining engineer, United States Bureau of Mines, Pittsburgh.

W. L. Saunders, president American Institute of Mining Engineers, New York.

B. B. Thayer, past president of the American Institute of Mining Engineers, New York.

Sub-Committee on Metallurgy

W. R. Ingalls, president Mining and Metallurgical Society of America, chairman.

Dr. F. G. Cottrell, chief chemist United States Bureau of Mines, San Francisco.

Dr. R. H. Richards, professor emeritus of mining engineering and metallurgy, Massachusetts Institute of Technology, Boston, and former president of the American Institute of Mining Engineers.

Bradley Stoughton, metallurgical engineer, secretary of the American Institute of Mining Engineers, New York.

Dr. L. D. Ricketts, mining and metallurgical engineer, New York.

Karl Eilers, metallurgical engineer, New York.

W. R. Walker, assistant to president United States Steel Corporation, New York.

Dr. G. H. Clevenger, professor of metallurgy, Stanford University, Cal.

The American Society for Testing Materials now has a total membership of 1944, a gain of 303 since Jan. 1. As a result of the recent mail ballot a number of specifications have been adopted, including boiler tubes, welded pipe, chain and open-hearth automatic screw stock.

Detroit Steel Castings Company's Plant

Equipped for a Wide Range of Products—Some of the Features of the Mold and Core Handling Arrangements

The plant of the Detroit Steel Castings Company has been in existence longer than most steel foundries in the United States. In 1888 as the Detroit Steel & Spring Company, which was the predecessor of the present company, the company installed two Roberts Bessemer converters of 2 tons capacity each. These converters were in operation most of the time up to 1913. They were among the first side-blown converters in the United States. Much experimental work was done with them during the early days both in the production of steel castings and the production of ingot steel.

Fig. 1—Groups of Molds Handled on Skids

Later the firm name was changed and two 20-ton open-hearth furnaces were installed. The character of the work swung from light to heavy, and for some time the main portion of the output was medium to heavy jobbing work, including railroad castings and a general heavy jobbing line. Later the light automobile castings came into demand and in 1913 the old converters were removed and replaced by more modern side-blown converters of 1 ton capacity. At present the plant is making 12 to 15 blows per day with a converter, and most of the time one of the open-hearth furnaces is in operation, though at times both furnaces are needed.

One furnace is equipped for use with producer gas and the other for burning liquid fuels. This latter furnace has also made history. The Solvay Process Company co-operated with the Detroit Steel Castings Company some years ago in a series of experiments on the burning of tar in open-hearth furnaces, and for two years this furnace burned tar successfully. First there was a campaign of six months, and then the price of fuel oil went down and a change to fuel oil was made. Later the fuel oil price went up, and for 18 months the furnace was run on tar entirely. For some time past the price of fuel oil has been so low it has been cheaper to use it than to use tar.

The use of tar in the furnaces introduces a number of factors not ordinarily encountered in furnace practice. In the first place all of the tar lines have to be arranged for warming or jacketing with steam, and they are much more liable to stoppage than fuel oil lines. All of these factors have to be taken into consideration in making up the expense account when operating with tar as a fuel.

The general arrangement of the foundry is very good for a plant of this type, as shown in Fig. 2. The main foundry building is divided into three bays. The south bay contains the melting furnaces and the core room. The melting furnaces are located near the center of the building, and the core room at the front, and one of the cleaning rooms at the rear. Certain classes of castings are cleaned

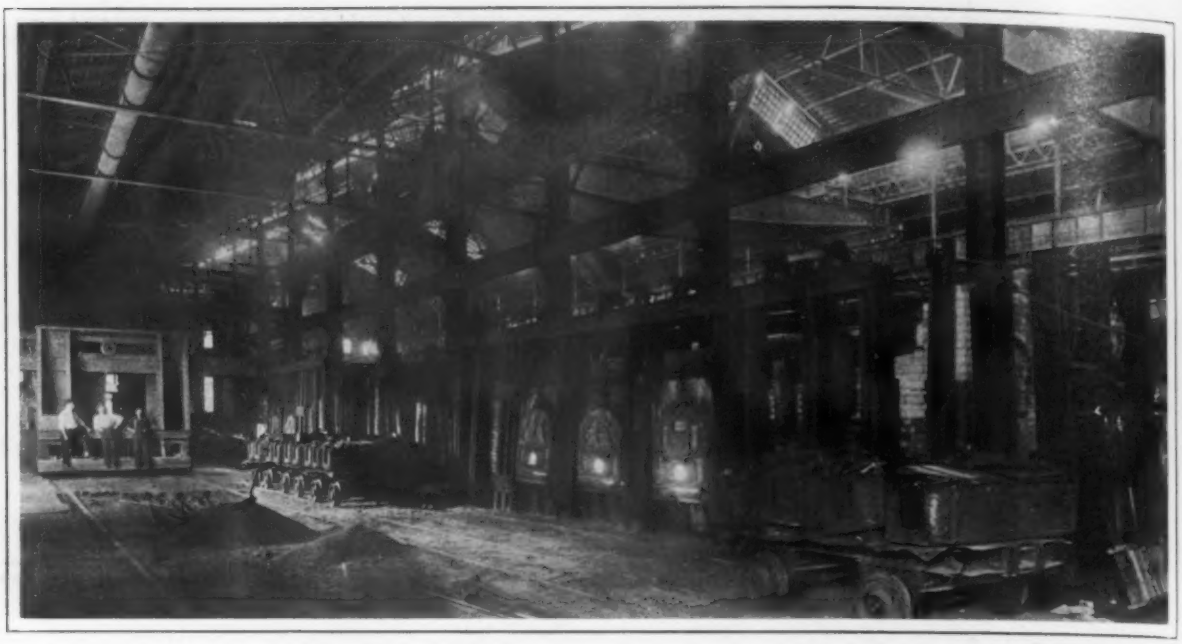


Fig. 3—The Melting Furnaces Are On the Level of the General Foundry Floor

on this side of the foundry as they require certain treatment, and it is desired to keep them separate from the other work. Such railroad work as center plates, striking plates, frames, etc., are handled here.

Most of the pouring of the open-hearth work is done in the central bay, though at times open-hearth metal is transferred to the side bay at the north. At the east end of the central bay there is a green sand molding floor. Below this there is a dry sand floor. Still further down is another green sand floor, and at the lower end of the building is done the shaking out, chipping and annealing. In the north bay are located the main cleaning departments, the shipping department, the large mold ovens and a portion of the molding space.

Extending from the north bay there is a wing containing the converter foundry, and converter

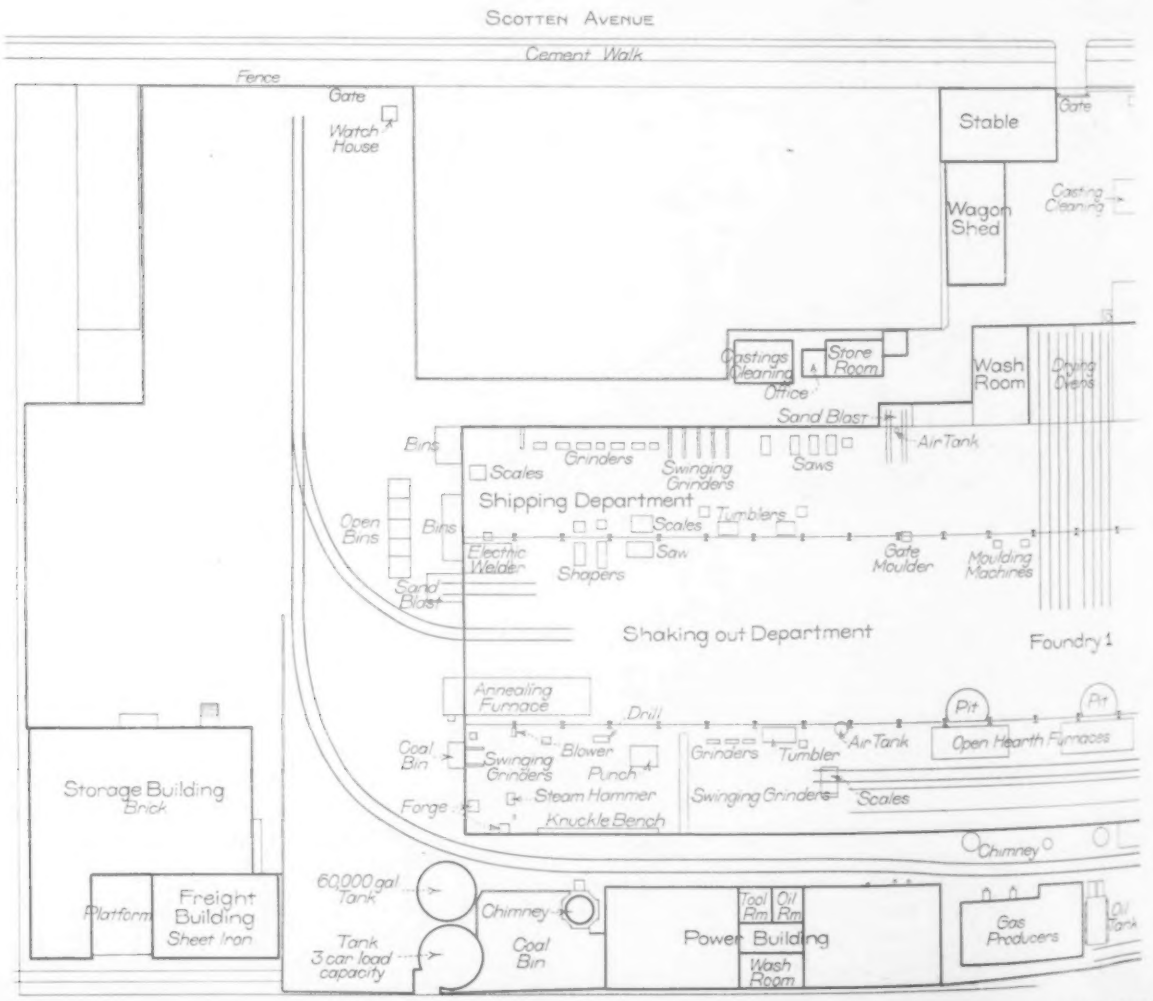


Fig. 2—The General Arrangement of the Foundry

Fig. 4—General Arrangement of the New Core Room

metal can be carried into the north bay of the main building or open-hearth metal transferred into the converter shop.

The plant is well equipped with traveling cranes. There are two 5-ton cranes in the east bay, one devoted to the furnace work and the cleaning department, and the other to handling work in the core room. In the central bay there are two 25-ton cranes and three 10-ton cranes. In the west bay there are two 5-ton cranes and in the converter shop one 5-ton crane.

This shop has also helped to make history in molding machine work. Many machines have been tried out at various times in its history. At the present time the following machines are in operation:

One 20-in. cylinder Mumford jarring machine. This machine is located in the central bay, is used

of the Detroit Steel Castings Company

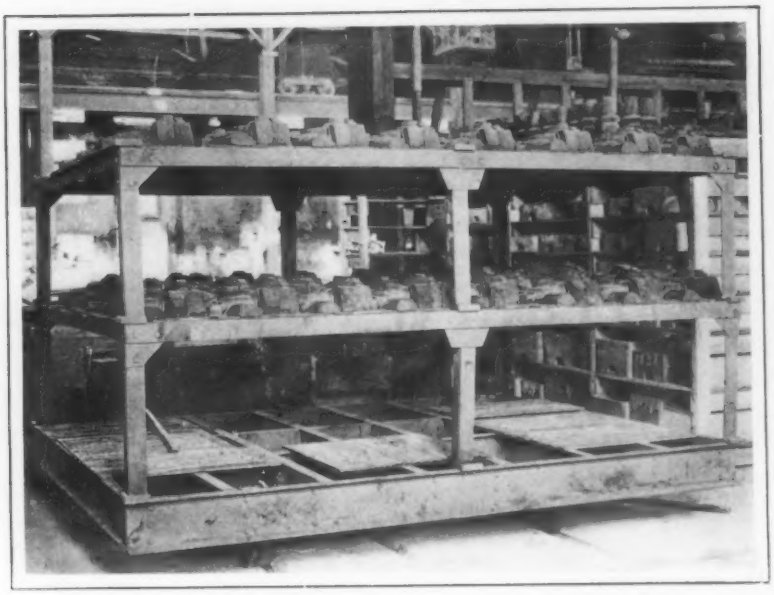


Fig. 6—Car for Cores with Removable Racks

for jarring up large molds in this part of the foundry, and in this bay there are also one 10-in. and four 6-in. Mumford jarring machines, and in the core department two 3-in. Mumford jarring machines. In the main bay of the foundry there is a Herman jar and roll-over machine.

Among the other machines may be mentioned 2 Pridmore roll-over machines; 2 Osborn jar and squeeze machines, 2 Buch hand jar and squeeze machines and 2 Rathbone multiple molding machines.

The shape of the yard and the manner in which the railroad enters made the planning of the handling of the raw materials somewhat difficult. Raw materials are handled now as far as possible with a railroad type locomotive crane, which operates in the yard, employing for pig iron and scrap a magnet and for sand a grab bucket. This crane also performs all the switching in the yard.

The melting furnaces are arranged on a level with the foundry floor so that the charging floor and foundry floor are on the same level, as shown in Fig. 3. Fig. 2 gives the general plan of the plant, which indicates the location of the furnaces. Fig. 1 gives a general view of a portion of the central bay of the foundry looking to the east. The furnaces are on the right, and the heavy work floor at the extreme end of the plant. Figs. 1 and 3 also show the character of roof. The roof itself is made of tile furnished by the Ludowici-Celadon Company, Chicago. The tiles are supported on purlins, and are of the interlocking type. The roof in the central bay is also arranged with cross monitors, shown in Fig. 3.

In Fig. 1 one interesting feature in connection with the railroad work is shown, and this is the use of skids for handling a group of molds. The skids are taken to the molding machine and the drags placed on the skid. A skid full of drags is then shoved to the casting floor, the molds are cored up, and the copes rammed by hand and placed on the molds, and the pouring basins formed. After the molds are poured, the skid is picked up and taken to the cleaning department, thus permitting the use of the floor at once for another set of molds. The flasks are returned as soon as the molds are shaken out, and in this manner the work continues.

In the light work and particularly in the truck work for the Packard Company, now being turned out in large quantities, the core work plays an important part. Recently the core department was rearranged and a new battery of ovens constructed. This work was done under the direction of the H. M. Lane Company, as foundry engineer. The general arrangement of the new core room is shown in Fig. 4. The benches are of the back opening type, with sand alleys between, and the core cars

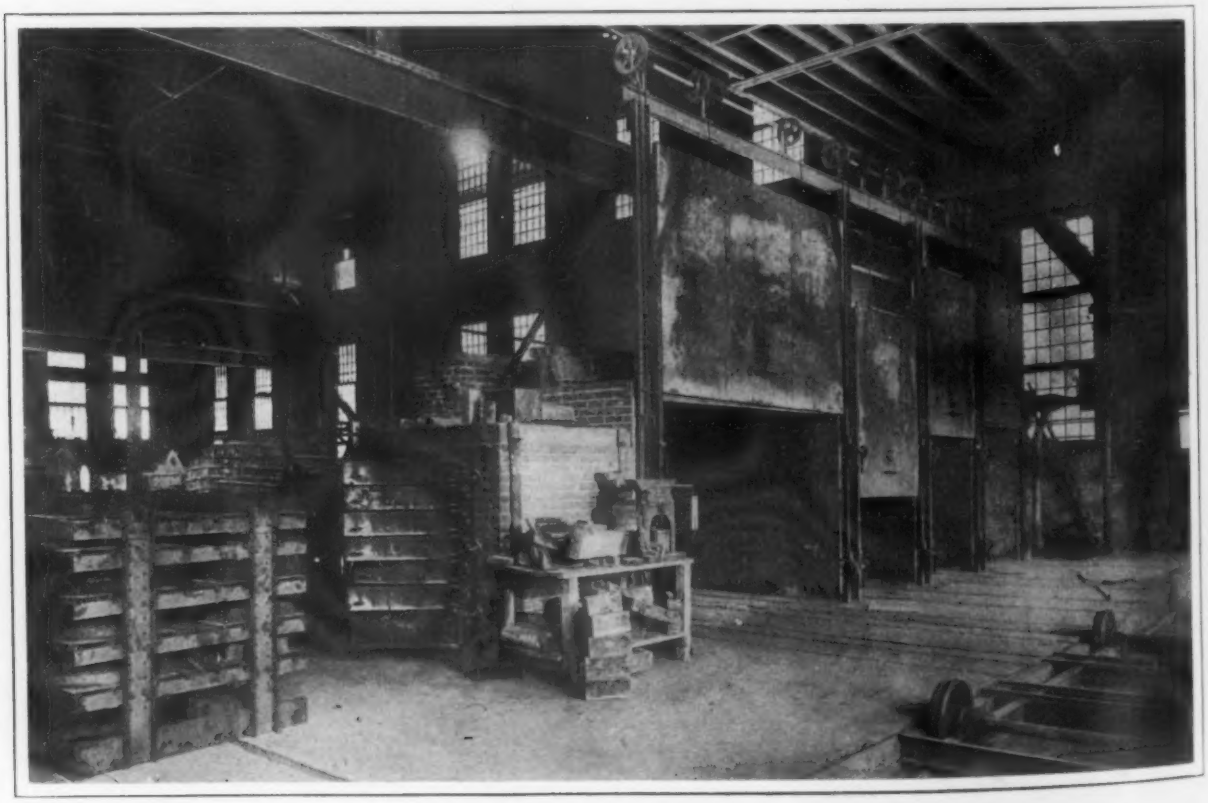


Fig. 5—One Wide, Three Narrow and One Small Core Oven

or core racks are placed between the benches for filling. At the time this picture was taken the core storage had not been completed. This forms a room between the core room and the foundry proper, and into this room all the cars are checked and arranged for delivery to the foundry as required. There is a transfer pit extending the entire length of the core room which serves to shift cars from between the benches to the ovens or from the ovens to the cooling track.

The ovens are shown in Fig. 5. They are of the forced draft type. The battery consists of three narrow or standard ovens and one wide oven made to take two standard core cars at a time, or to take one wide car for large work.

At the end of the battery of ovens there is a small oven which is fired from the same fire pit. The fire pit is at the back end of the room next to the wall, and the blast pipes for the forced draft system can be seen crossing the window, and passing down to the floor. The coke supply is introduced through a chute on the outside of the building. The ovens are equipped with Hoskins pyrometers, and all the leads are brought to a point near the fire box.

The large car for heavy work shown in Fig. 6 possesses a number of features of interest. As shown it is equipped with two removable racks which will lift off or on as required. At the time the picture was taken the car happened to be full of rather small work. There are times when the large cars and racks are not required for several days, and in order to get them out of the way on such occasions provision has been made to lift them up with a traveling crane, and put them on the sand bins back of the sand mixing department, as shown in Fig. 7. In this illustration one of the large cars has been placed on the skids with some large cores still on it. These cores are for transmission cases for automobile trucks.

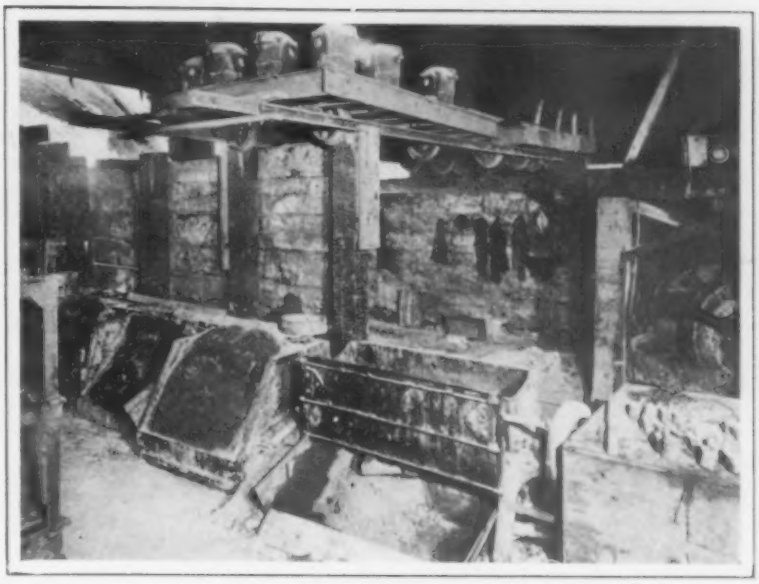


Fig. 7—Cores Stored on Bins back of Sand Mixers

Back of the large car on the skids there are two cars of the truck type made for taking special racks. These racks are handled with a traveling crane. They are lifted off from the cars, set near the core makers and filled with green cores, one of the racks being shown in the foreground in Fig. 4. After the rack is filled it is set on the truck and run into the oven. After baking it is either taken to the cooling department on the truck as an ordinary car, or it is handled with a crane. With some class of work they take the racks and trucks by means of the transfer car, and pass them through to the main bay of the foundry, when the racks are lifted off, and taken to the molding floor, the whole rack full of cores being delivered at one time. In this way the cores are placed on the

Fig. 8—Swinging and Stationary Grinders in Cleaning Department

rack cars by the core maker, and are taken from them by the molder and set into the mold. This minimizes core handling. Fig. 7 also shows one of the large pan mills for mixing sand for the steel foundry, and a batch mixer furnished by the Standard Sand & Machine Company for mixing core sand. For carrying cores through to the foundry various types of wooden boxes have been devised so as to minimize handling.

Fig. 8 shows a portion of the cleaning department. In the rear at the right is a group of swinging grinders, and in the foreground the stationary grinders. The castings shown in this illustration are truck parts for the Packard Motor Car Company. As a result of the European war the demand for Packard trucks increased so much that from March 1 to June 12, 1915, the Detroit Steel Castings Company furnished the Packard Company with 66,290 castings, totaling in weight considerably over 1000 tons.

The general object sought in laying out this plant has been to arrange for a continuous flow of the finished product and this necessitated the breaking up of some of the departments; for instance, there are several places where the castings are sand blasted, there are five or six groups of grinders and there are other similar arrangements to facilitate the constant flow of the finished product. This has been found better than to try and arrange one department for each class of work.

NATIONAL SAFETY COUNCIL

Fourth Annual Safety Congress at Philadelphia, Oct. 19 to 21

The National Safety Council, the nation-wide organization for the prevention of accidents in the industries, on the railroads and in public places, will hold its fourth annual safety congress at the Bellevue-Stratford Hotel, Philadelphia, Oct. 19 to 21, inclusive. One of the features of the meeting will be simultaneous sectional meetings on Wednesday and Thursday, Oct. 20 and 21, some of them of the informal round table sort. These separate sessions are for the cement industry, for the laundry, for mining, for paper manufacturing, for public utilities, for railroads (this section having a program taking all day Wednesday and all of Thursday morning), for the textile industry, for medical supervision and care of employees, for safeguarding machinery, for the foundry and for woodworking plants.

The opening session of the congress is scheduled for Tuesday, Oct. 19, at 10 a. m., R. W. Campbell, Illinois Steel Company, president of the National Safety Council, presiding officer. This session will be occupied largely with reports of officers and committees, including those of the standardization of safety devices committee, the industrial hygiene committee, the accident statistics committee, the danger signs committee and the fire prevention committee.

On Tuesday afternoon, at 2 p. m., will be held a general session, under the chairmanship of John Price Jackson, commissioner of labor and industry of Pennsylvania. Among the addresses announced are the following:

"The Vital Importance of the Visiting Nurse in Industrial Welfare Work," by Miss Florence Hughes, superintendent Palmerton Neighborhood House, New Jersey Zinc Company, Palmerton, Pa.

"Standardization of Safeguards," by Carl M. Hansen, secretary Workmen's Compensation Service Bureau, New York City.

The section on safeguarding machinery is scheduled for Oct. 20, 2 p. m., with Robert J. Young, manager Department of Safety and Relief, Illinois Steel Company, Chicago, as chairman. Ten-minute discussions are announced as follows:

"The General Subject of Safeguarding Machines and Tools," by J. M. Woltz, safety director Youngstown Sheet & Tube Company, Youngstown, Ohio.

"Construction of and Cost of Making Safeguards in Shops," by Harry Guilbert, chief safety inspector American Car & Foundry Company, Chicago.

"Safeguards for Abrasive Machinery," by E. B. Tolsted, safety engineer Independence Inspection Bureau, Philadelphia.

"Safeguards for Air Compressors," by William P. Eales, safety engineer Travelers Insurance Company, Philadelphia.

"Punch Press Safeguards," by S. V. James, mechanical engineer Casualty Department, Underwriters' Laboratories, Chicago.

"Annealing and Inspection of Crane Chains," by Earl B. Morgan, safety engineer Commonwealth Steel Company, Granite City, Ill.

"Crane Safeguards," by J. Claude Smith, chief safety inspector Inland Steel Company, Indiana Harbor, Ind.

The foundry section, Oct. 21, 9.30 a. m., is to be conducted by Dr. Richard Moldenke, Watchung, N. J. The 10-minute discussions are as follows:

"Foundry Floor," by Houston L. Gaddis, manager Accident Prevention Department, Ferro Foundry & Machine Company, Cleveland, Ohio.

"Foundry Yards," by George T. Fonda, safety engineer Bethlehem Steel Company, S. Bethlehem, Pa.

"Handling of Materials," by A. L. Clark, superintendent Western Foundries, American Brake Shoe & Foundry Company, Chicago.

"Eye Protection," by F. G. Bennett, safety department, Buckeye Steel Castings Company, Columbus, Ohio.

"Hand and Foot Protection," by B. W. Conlin, safety inspector National Malleable Castings Company, Chicago.

"Lighting, Heating and Ventilation from the Standpoint of Safety," by W. A. Herron, president Duquesne Steel Foundry Company, Pittsburgh.

The medical supervision section will be held Oct. 20, 2 p. m. Dr. Otto C. Geier, Cincinnati Milling Machine Company, Oakley, Cincinnati, will be chairman. Among those to take part are the following: Dr. W. H. Clarke, Norton Company, Worcester, Mass.; Dr. Sidney A. McCurdy, Youngstown Sheet & Tube Company, and Dr. Lloyd Noland, superintendent Department of Health, Tennessee Coal, Iron & Railroad Company, Birmingham, Ala.

A banquet will be held on the evening of Oct. 20 at which "no alcoholic liquors will be served."

Business Conditions After the War

An interesting estimate of what may be part of the readjustment to be looked forward to when peace prevails in Europe is contained in the concluding paragraphs of the following notice posted by the Morgan Construction Company, Worcester, Mass., on Sept. 9.

OVERTIME BONUS

The war in Europe has placed temporary but unprecedented burdens on the machine shops of this country. We find ourselves obliged either to place a great deal more work in outside shops or to operate overtime.

In order to give the members of our organization the opportunity to earn more money, we have decided to run overtime, and the several foremen will request the operatives of such machines as can advantageously be used to work over regular hours.

It is to be understood distinctly that men so requested are at liberty to work or not, as they choose, entirely without prejudice.

In order to accomplish the maximum production here and to stimulate the whole organization to this end, the company will pay a special bonus for overtime work, based upon the number of hours of overtime work put in by each man. This overtime bonus will be paid once in two weeks in special envelopes, and will be continued until the end of the present war.

The regular bonus system of the company, established several years ago, will be continued until further notice, and is not affected by the temporary overtime bonus.

It is almost certain the war will be followed by a world-wide reconstruction period, in which we shall see keener competition than ever before, and that in this country times will be exceedingly hard.

We urge every man to be preparing for this condition by laying by now every dollar he can.

Commercial Problems of the Foundry

Extracts from Typical Chapters of Dr. Moldenke's Work on "The Principles of Iron Founding"—The Scheme of Organization

THE IRON AGE is permitted to present in this Special Foundry Number some extracts from the early chapters of a forthcoming book, "The Principles of Iron Founding," by Dr. Richard Moldenke. The publisher is the McGraw-Hill Book Company, New York. Dr. Moldenke, with his long experience in foundry operations and by his contacts with the industry as consulting engineer and for so many years as secretary of the American Foundrymen's Association, has contributed to the solution of foundry problems to an extent altogether unique. What is given below is from the chapters dealing with the commercial and management sides of the manufacture of castings. The metallurgical and operating chapters are particularly full.

Specializing in the Foundry

The goal every foundryman aims at is the acquirement of a line of product which can be made as near a profitable monopoly as possible. Whether this is brought about by exploiting a basic patent, because of a thorough mechanical excellence in some general line, or the undercutting of every competitor through some special circumstance—for secrets in manufacture have no place in the foundry any longer—the fact remains that with a specialty that either pays well or keeps the shop busy making stock in dull times, a foundryman need not worry so much about the future.

Foundrymen should therefore go out of their way a little to encourage new lines of work requiring castings, charging this to profit and loss if it becomes necessary. Further, they should be constantly on the lookout for connections that may mean stocking castings. The railroads and other large corporations constantly adding to their equipment are cases in point. For a consideration in the way of reasonable or flat rates in payment on work sent in by blue print—meaning the making of patterns and chancing the tonnage—a foundry may be guaranteed the acceptance of large additional supplies of designated castings. The arrangement of a warehouse to hold the material made in surplus and the filling up of time between jobs in the foundry make this method an exceedingly valuable one, so that it comes close to specializing.

The above refers specifically to the ordinary jobbing foundry, history showing that most of the present specialty foundries were once of that class. Once a specialty has been developed, an enormous expansion becomes possible in this country, as may be seen in the manufacture of stoves, carwheels, pipe and fittings, agricultural work, rolls, hardware, etc.

The Continuous Foundry and the Permanent Mold

Where the nature of the work allows the molding up to be fairly rapid, so that were molten iron at hand and could the sand be retempered quickly, pouring off might be resorted to off and on during the day, it pays to consider the question of melting all day long. Foundries making cast-iron pipe, fittings, air-brake specialties, malleables, etc., have found this to be the case and have saved themselves immense investments otherwise necessary for plant enlargement. After all, it becomes a question of the floor space taken up by molds ready to be poured off.

The introduction of the jarring machine, with the possibility of closing up the molds shortly after starting up, instead of days after as was formerly the case, should tend to this desirable end. Be it remembered that the curse of the country's manufacturing situation has always been over-equipment—the capacity for turning out work far exceeding normal requirements. With more foundries running continuously in their melting, or at least partially so, there is not the temptation to add to plant capacity until it becomes absolutely necessary. A very considerable production above normal can be cared for by this method.

The author, at a time when he made some fifty tons of gray iron castings daily, found it convenient to start the cupola in the morning hours, run awhile, shut down again, and then run the last hours of the day. This allowed the pouring off of many molds which would otherwise have been held, and the men kept on molding nearly all day.

As to the permanent mold, of which one hears so much in the foundry, but which seems so elusive as yet, the day will unquestionably come when much of the repetition work which lends itself to this line of endeavor will be made in at least "long-life" molds, if not the so-called permanent (iron) ones. Most of the work done so far has been with cast-iron molds protected with more or less valuable coatings. Usually too much has been attempted, one system involving such enormous weights that it became prohibitive. Another system had such light molds that a hundred applications wore them out. Again, another experiment required iron practically free from manganese, another iron excessively high silicon, and so on.

The very use of a non-refractory material such as cast iron would seem diametrically opposed to the requirements of the case, unless indeed the conductivity of the mold can be counteracted. This is attempted somewhat by the graphite coating applied. Probably the ultimate solution will be found in getting hold of a refractory material able to withstand the high temperatures involved indefinitely, to resist the penetrating action of the metal, slag, etc., the wear and tear of service, and thus allow the construction of a mold of sufficiently long life to give an effective substitute for hand molding. With a constant proportional diminution of the visible supply of molders facing the industry, it is to be hoped that the so-called permanent mold may eventuate, and much of the repetition work of the foundry be taken from the skilled men, so that their services can be used to better advantage elsewhere on the floor.

Launching a Foundry Enterprise

In tracing the development of the foundry industry, it is well to consider how new enterprises of this kind have come to be established, in order to estimate the probable future expansion. Again, by observing the several stages of enlargement in instances of striking success, valuable lessons in organization may be learned. When all has been told, conditions being favorable as to location, that establishment runs full time longest, when things grow dull, which has the best organization.

In providing the many visiting foundrymen of foreign countries with introductions to the prominent establishments of the United States and Canada, the author has always impressed upon them that the keynote of the successful operation of the plants they

would see was to be found in the exceptionally able organizations, and unless the visitors could become acquainted with the business methods and operative policies the full advantages of the inspection would not be gained.

Many foundries have been established as new departments of existing manufacturing plants. In former times the blast furnaces furnished all the castings of the iron mills. These establishments eventually, however, found it desirable to remelt their metal going into castings, in the interest of soundness and strength. In more modern times we find the fluctuations of business activity, with the accompanying poor deliveries and excessive prices when times are brisk, bringing a manufacturing plant to such straits that in self-defense a foundry is added.

Again, a manufacturing plant may be so located that the purchase of castings becomes exceedingly inconvenient. The market drawn from may be a hotbed of labor troubles. It often happens, moreover, that the castings required are so difficult to make that no conveniently located foundry cares to rig up for the work at the prices offered. Finally, when the tonnage is sufficiently large it certainly pays a manufacturing concern to make its own castings. Hence the constant increase in the number of foundries from year to year, the sum total in the United States and Canada in 1914 being close to 7000.

Then come the foundries established as independent ventures. Frequently these are the result of community spirit in the local chamber of commerce, inducements in the way of land or exemption from taxes for a time being given. A newly conceived project is oftentimes made possible of existence in this way, or an old-established concern starving in another location may be brought over and rejuvenated. As a general rule, proved by the successful exceptions, a concern that finds it necessary to depend upon such aid ultimately pays very heavily for it.

We also have the individual severing his connection with an existing foundry and branching out for himself. He may be the foundry superintendent or foreman, the foreman patternmaker, or an office man. Better still, when a foundry foreman and patternmaker combine, which will be found to have been the origin of many a successful foundry of the present day. If in line with the development of possibilities in the region selected, enterprising men with ideas will create a good business.

DANGERS OF INEXPERIENCE

It is necessary to consider one serious phase in such an industrial development, and that is the effect produced by the organizer of a new foundry enterprise who has no practical knowledge of the business. He induces others to join with him, often by means of a prospectus containing glaring absurdities in the way of promised returns. The start is made. Prices are slashed to get business, and not only will failure be the inevitable result, but the trade of the region affected is demoralized for a long time to come.

Whoever wishes to embark in the foundry business should first of all know what there is to it. Next he must be assured of a reasonable market to take up a minimum daily production. Finally he must have capital, and be able to get more. The first cost is not great, $10,000 oftentimes covering the ground—wooden buildings, second-hand equipment and working capital—until the turn is made. Pipe, stove, carwheel, agricultural and other foundries of comparatively large tonnage capacity are invariably begun by an association of individuals knowing all about the business. Big capital is necessary here, as well as an assurance of a market for at least half the contemplated output.

Existing manufacturing plants requiring both iron and brass castings usually equip for iron first, as the brass product which involves much more expensive materials is a problem approached more cautiously. When it comes to adding a malleable or steel-casting department peculiar care should be taken. A tonnage of sufficient size is absolutely essential, as otherwise outside work will have to be found, and this usually at actual cost. The result, again, is a demoralization of the outside trade. Of late the addition of a malleable and steel department to large establishments operating the open-hearth furnace has become very advantageous. The author in his own establishment continually alternated malleable and steel heats in the same furnaces. Thus a smaller tonnage of each material would justify the creation of the new department, where with separate installations this would not be the case.

Organization of the Business

Among the cardinal principles that should be kept constantly in mind by the management of a new concern and impressed upon the employees all the way down are the following:

First, the aim should be to produce only high-grade work. At every point in the several processes used there should be provided some means to check the quality of output. Whether in the sorting, the test room, or other parts of the shop, the manager should make it his business to appear unexpectedly to inform himself at first hand on what is doing. There is a natural tendency to take chances, and even the superintendent hates to pass up statements showing heavy avoidable discounts.

KNOW COSTS ACCURATELY

Second, the high-grade work produced should be sold at as near the top figure the market will bear. This means good salesmanship. To do this it is necessary to observe a third principle. Know your costs to the smallest necessary detail. This cannot be urged too strongly. The great source of the evils resulting from injudicious competition is an imperfect cost system. Who, in asking prices on various classes of work, has not been astonished at the great variation in the quotations? Apparently the bidders were all able men in their line, and could judge the actual labor and metal cost to the fraction of a cent per pound. On their overhead expense, however, very few realized the true situation. The lowest man would get the job, and the best would think, "If so-and-so, whose shop and costs are practically identical with mine, can take this work at his figure, I should be able to do the same," and the next time all would be lower and take chances on losing money. Shrewd customers constantly play upon this characteristic of foundrymen and thus get their work cheap. The so-called "sleeping" customers of foundries have to make up these losses by paying non-competitive prices.

On the other hand, it is not necessary to go into shop costs in unnecessary detail. Every clerk added to the office represents the interest on a respectable amount of investment. No cost system should do more than show in the simplest and quickest way just what is needed to get reliable results. Any extra detail, while interesting to the efficiency expert, ordinarily is money thrown away.

The fourth principle to be adhered to is the fixing of responsibility from top to bottom. To get the best results an employee should be held to the full responsibility of the position he occupies. It follows as a necessary consequence that he should not be interfered with in directing his subordinates. Results are wanted, and these with the slightest amount of friction. If an officer or foreman cannot manage his men properly, or treats them unfairly, he should be got rid of quickly.

This emphasizes the importance of selecting proper men. Indeed, it is one of the essentials of success.

THE MAN FACTOR

A foundry is always run best when there are as few rules posted as possible. The human element must be considered and employees have their personal liberty interfered with as little as may be, consistent with efficiency and the proper care of the property. By letting the men feel that absolute justice shall prevail, good work be rewarded, and every bad job will be fastened on the one responsible, selective advancement becomes possible in an establishment, and gradually a splendid and efficient organization will be built up.

This brings up the question of "welfare work" in the foundry. As men are constituted, they do not care for recreation rooms other than at home. Nor do they enjoy night school lectures as a general thing. From the lower depths of foundry labor, where the water pail and possibly a piece of soap is used for cleaning up just before going home, if indeed even this trouble is taken, we rise to the efficient mechanic who appreciates the shower and sanitary toilets. The experience of the author indicates that it is advisable to keep the welfare facilities just slightly ahead of the make-up of the men. Nothing is more disappointing to a concern than to equip a fine change room, only to find it either little used or damaged through carelessness and ignorance. As the class of men rises in intelligence—and every works to have a chance to live must aim at this—improvements in the sanitary facilities offered should be made, welfare work of other kinds instituted, shop suggestions received and rewarded, and encouragement given the individual to rise above his surroundings.

MANAGEMENT

In modern systems of management the committee idea is becoming more and more firmly intrenched. A one-man power is always irritating, and those who have had experience in both directions vastly prefer to discuss and settle upon lines of policy and action in the committee room, every department interested being represented. From our very largest corporations, where everything is done by committees, to concerns which encourage the meeting of the shop management with representatives of the men employed, the most efficient work with a minimum of friction is brought about by this method of operation.

In a small foundry the owner of the business may require only a good foreman, a pattternmaker and a clerk. In a very large organization the board of directors is supreme as representing the investment. There may be a chairman of this board who looks after the political and legal sides of the enterprise. The president of the company has the general supervision of its activities and his special duty is to bring in new connections. The vice-presidents divide the operating, sales and ordinary finance among themselves. The secretary has the office and correspondence. The treasurer, if not a figurehead, looks after the accounting, otherwise an auditor does this. Each general officer usually has a confidential assistant clothed with more or less power. The works are preferably operated by general superintendents in conjunction with advisory boards who report to them. These boards are made up of superintendents, experts and foremen, and these may also meet with the general officers of the organization. In the case of corporations with many works widely separated, a manager of works may be appointed, or even district superintendents required. A live concern watches for specially efficient men who are by disposition fit to be entrusted with supervisory work. Far better to advance your own men than to go outside. Superintendents and foremen should be sent about the country and even abroad occasionally to keep in touch with the art and pick up information. Certainly always to foundrymen's conventions, to rub up against fellow-craftsmen and supervisors, and thus gain knowledge.

If the sales and operating forces are combined there is usually a general manager at the head, though this office is generally found in neither very large nor very small establishments.

It will thus be seen that the exigencies of American manufacturing enterprise have brought about an elaboration of the supervisory end of the organization detail. This is the result of the terrific competition existing. In properly organized and conducted establishments every general officer is a man of high standing in the community, adding strength to the enterprise. Each superintendent is a man picked for his special fitness and commanding a salary which keeps him alert for fear of losing it. The larger the business the more it pays to see that every one does his work, and as by wise direction expansion cannot but take place in a growing country, the cost of supervision per ton of output should fall steadily.

A group of men, therefore, who contemplate the organization of a new foundry enterprise, can do no better than give the principles enumerated above careful consideration. They will then start right, and not have to pull up short after every foundry tramp of the country has passed through the shop, foremen have been lost and changed, and the shop generally run down.

Efficiency Society Meeting

The Efficiency Society held a meeting at the Lake Placid Club, in the Adirondacks, on Sept. 17, 18 and 19. There were addresses and papers of a general character, uplifting and inspiring, and others of specific technical interest, particularly one group having to do with problems of factory management. Some of these papers will be reviewed as space allows. Meanwhile it may be said that the annual fall meetings which the society has held in the mountains have proved the practicability as well as pleasure of convening in a self-contained vacation resort which is without the distractions of a meeting in a large city. This year the president of the society is Dr. Melvil Dewey, who is also president of the Lake Placid Club.

Among those present may be mentioned John Calder, president Manufacturers Equipment Company, Boston; Walter Wood, R. D. Wood & Co., Philadelphia; George D. Babcock, H. H. Franklin Mfg. Company, Syracuse, N. Y.; Frank O. Wells, president Wells Brothers Company, Greenfield, Mass.; Morris Knowles, consulting engineer, Pittsburgh; Frank B. Gilbreth, consulting engineer, Providence, R. I.; W. J. Coward, controller Manning, Maxwell & Moore, New York; C. E. Knoeppel, consulting engineer, Worcester, Mass.; C. B. Auel, director of standards, processes and materials, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.; Dwight V. Merrick, consulting engineer, Philadelphia; W. B. MacLean, advertising manager, Otis Elevator Company, New York; Boyd Fisher, Chamber of Commerce, Detroit; Harold P. Gould, advertising manager Joseph T. Ryerson & Son, Chicago, and Roger W. Babson, Wellesley Hills, Mass.

The Central Steel Company, Massillon, Ohio, will increase its open-hearth capacity by the installation of four additional 60-ton furnaces, with ladles, ingot buggies, charging boxes, etc. Other mill equipment will be added as follows: One 100-ton ladle crane, 7½-ton soaking pit crane, 5-ton high type charging machine, 15-ton open-hearth floor crane, 15-ton stock yard crane, 15-ton skull cracker crane and 15-ton billet yard crane.

The Elyria Iron & Steel Company has completed its new Cleveland plant for the manufacture of welded tubing, which will be operated in connection with its plant in Elyria, Ohio. The company has moved its general offices from Elyria to Cleveland. These will be located at the plant on East 131st Street.

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Magnetic Iron Ores of Minnesota

The development of the magnetic iron ores of Minnesota has been an interesting possibility for a number of years. The magnitude of the deposits and the desirable character of the ore, together with its reasonable accessibility to transportation, have made the mining of it a commercial certainty in due time. Thus far the neighboring ores of the Mesaba district, with their low mining costs and abundance, have held back the development of other ores to an extent out of proportion to their availability. The slow gains in production in the Moose Mountain and Sudbury districts are perhaps instances of this, although other influences also have been unfavorable in these cases.

It now seems probable that the next year or two will witness the opening up of some of this Minnesota magnetite. Deposits less than 70 miles north of Duluth and directly east of the Mesaba range exist where open cut quarrying methods can be adopted in getting out the ore, and since the product could be marketed in large part as lump ore, the remainder being briquetted, the costs, considering the quality of the ore, would be such as to make the undertaking attractive. These ores are of such porosity as materially to accelerate the driving of the blast furnace and are unusually dry, the moisture content hardly exceeding 1 per cent. They will analyze over 60 per cent iron, natural, which on the basis of average moisture of approximately 12 per cent for Mesaba ore would be equivalent to about a 68 per cent dried ore of that range. The steadily declining iron content of other Lake Superior ores is in marked contrast with such richness in iron.

The increasing scarcity of lump ore for use in open-hearth practice is another incentive to the bringing of these magnetites upon the market. It is generally understood that one of the largest owners of Lake Superior ores is already taking special care to separate lump ore out of its annual shipments, the quotas of lump ores allotted to its various open-hearth plants being considerably less than their needs. Assuming a practice of 300 lb. of ore to the ton of steel in the open hearth, annual requirements for this purpose alone would approximate 3,000,000 tons. With the tendency toward increased open-hearth production the need of lump ore for this purpose is certain to become even more pronounced regardless of the accommodation of blast furnace practice to the use of fine ores.

The Minnesota magnetite deposits also yield an ore within the Bessemer requirements as to phosphorus, and it may be assumed that the production of Bessemer steel will not show a decline in tonnage more rapid than the decreasing supply of Bessemer ores from present producing mines of the Lake Superior district, which fact lends added probability to an early marketing of ore from some of these eastern Minnesota deposits.

Immigration and Population

July showed no great change from immediately preceding months in the movement of aliens and citizens into and out of the country, but each month that passes makes the situation as to our foreign-born labor supply just so much more critical, as for very many years we had been accustomed to a regular influx. In July, 27,097 aliens were admitted, against 28,499 in June, and an average slightly less than that for the six months ending June, while 16,015 aliens departed, against 21,532 in June, and a slightly smaller average for the six months.

In general it may be said that practically the whole ecect of the war upon the movement of aliens had been accomplished by the early months of the present year. The alien arrivals had averaged about 120,000 per month for two years prior to the war, the alien departures averaging a trifle over 50,000 per month. After the war started the arrivals dropped sharply and then more slowly, reaching a minimum in February, since which time there has been an increase but not one which counts as to industry although it does tend to suggest a trend. When the war started the departure did not increase, but they decreased very slowly, with the result that in November, December and January more aliens departed than arrived, to the extent of say 10,000 a month.

An effect of the war was an influx of citizens. The normal condition is that of more citizens departing than arriving, for some of the foreigners who take out naturalization papers do not stay while few born citizens go abroad to die. In the fiscal year ended June 30, 1913, the citizens departing exceeded those arriving by 61,098, while next year the excess was 82,211. In the fiscal year ended last June, however, citizens arriving showed an excess of 67,167.

The war affected greatly the increase in our population through the movement of aliens, but the movement of citizens, as just indicated, made

partial offset. The entire movement as it has affected our population is depicted in the following table, covering the past three fiscal years as well as the month of July last:

Net Changes in United States Population

	By Alien Movement	By Citizen Movement	Total Change
1913	+815,303	—61,098	+754,205
1914	+769,276	—82,211	+687,065
1915	+ 50,070	+67,167	+117,237
July	+ 11,082	+ 3,912	+ 14,994

If one were to assume that the average increase in our population due to the movement of persons into and out of the country in the fiscal years 1913 and 1914 represented the normal, then to the end of July last, in 13 months, there was accumulated a deficit of 648,458, equal to 83 per cent of what would be the expectation under the assumption stated. The deficit is evidently to grow from month to month until a new immigration movement sets in after the war—a movement that may assume proportions calling for special restrictive measures.

Railroad Buying Prospects

It is the expectation in many quarters in the steel trade that the railroads will soon figure as large buyers of steel and equipment for 1916 delivery. Two factors enter into the question—the needs of the railroads and the desirability of their making early purchases against such needs as may be recognized. As to the making of purchases early, the judgment of individual railroad officials must as usual be tempered by knowledge of financial conditions and earnings prospects. The railroads are often criticised for not taking advantage of market conditions in their purchases, and, while the criticisms are doubtless just in a measure, sight is often lost of the very important fact that with a railroad the real value of the dollar is not, as with the individual who has the dollar, a fixed amount. In essence, the railroad buys its dollars with securities, and the cost of the dollar frequently decreases while the market price of the commodity that may be purchased is increasing. It is not to be inferred from the suggestion of this general principle that the issuance of fresh securities by a railroad is necessarily coincident with a purchase of a commodity, for all railroad finances are complicated, but the essence of railroad purchases is that there is fluctuation in the cost of capital as well as in the market value of materials.

As to the requirements of the railroads, some definite observations can be made. It is quite well understood that about the close of 1907 the railroads were forced to adopt a policy of retrenchment, and the general opinion is that they have not been keeping up their properties as well as formerly. This period of economy has now extended to eight years, and it is reasonable to assume that at some time or other it is to yield to a period of more extensive buying. It cannot by any means be asserted that conditions are now such that the period should end and a period of more rapid expansion ensue, but the very important observation can be made that, even if railroad buying activity in the past eight years, since 1907, is to be taken as standard or normal, the purchases of the past fifteen months or more have been far below that standard.

Using such data as are available, it appears that since 1907 the railroads have been taking locomotives at the rate of about 3000 a year, while the number in service has increased at the rate of about 1300 a year, so that about 1700 locomotives a year have been required to replace those abandoned. Of freight cars the railroads have been taking about 120,000 a year, while the annual increase in the number of those in service has been about 38,000, indicating about 80,000 a year required for replacement purposes. Replacements at a no lower rate are reasonably to be expected for future years, while it is probably the judgment of nine observers out of every ten that the increase in industrial activity in the United States, involving heavier freight traffic, is likely to be greater in the next eight years than it has been in the past eight.

The locomotive orders placed thus far this year make a very poor showing indeed as compared with the averages cited above for recent years, since it does not appear that thus far more than 600 locomotives have been ordered, indicating an annual rate quite below 1000, against an average of 3000 in recent years, of which more than one-half were required for replacements. Freight car purchases this year make almost as poor a showing—about 55,000 cars bought, or at the rate of about 75,000 cars a year, against a previous annual average of 120,000 cars. The light purchases of locomotives and cars this year, moreover, follow a period, the last five months of last year, in which there were scarcely any purchases at all. Thus, while the rate of buying by railroads since 1907 may be regarded as light, the rate of buying quite recently has been still lighter, and a change is reasonably to be expected.

Prospects of a car shortage, which presumably would mean a locomotive shortage as well, are now looming large. At various points in the iron and steel industry cars have been found in poor supply in the past fortnight. The idle car statement for Sept. 1 showed the remarkable decrease in August of 81,705 cars in the net surplus, to a net surplus of 183,659 cars on Sept. 1, and many of the cars reported as idle are probably not fit for normal service for any length of time. Such a decrease in August, long before any movement of crops, must be regarded as very significant.

Revenues and Preparedness

Political considerations are being insistently put forward at Washington to force the Administration to abandon a large part of its policy of preparedness, which has been tentatively formulated by the Secretaries of War and the Navy. The mainspring of this movement is the growing fear that any expansion of the Army and Navy worth the name would force an immediate and comprehensive revision of the Underwood-Simmons tariff. The tariff reconstruction on the eve of a Presidential campaign has been disastrous more than once to the party in power, and some of the most influential majority leaders in Congress have urged that there is greater danger to the party in

the overhauling of the customs schedules than in the granting of half a loaf, or less, to the people throughout the country who are clamoring for what President Wilson has described as a "safe, sane and reasonable state of national defense."

That radical measures must be adopted to put the Treasury on a better basis, even should Congress refuse to add a dollar to the military and naval appropriations, is easily demonstrated by figures now available. The deficit for the first two months in the new fiscal year amounts to $30,000,000, or at the rate of $180,000,000 for the full year, and the cash balance—a bare $50,000,000—at the present rate will last a little over three months, when the Treasury will be swept bare, unless in the meantime bonds are issued. This condition has been brought about notwithstanding the fact that the emergency war revenue act is in full force and the Treasury for the past year has collected three-fourths of the Payne-Aldrich tariff rates on sugar, the imports of which have reached record proportions.

A glance at the prospects for the coming year is not reassuring. Assuming that the individual and corporate income taxes, payable next June and July, will aggregate $80,000,000, of which about $70,000,000 will be payable before the end of the fiscal year, the prospective deficit can reasonably be put at $110,000,000. To this should be added Panama Canal and other debit items that will run the net deficit up to $125,000,000. Add a prospective postal shortage of $20,000,000 and refunds under the 5 per cent clause of the tariff, now estimated at $15,000,000 per annum and due for two full years by June 30 next, and the deficit is increased to $175,000,000. As sugar goes to the free list next May there will be few if any withdrawals from custom warehouses after Jan. 1, and the net annual loss to the Government as the result of the repeal of this duty will approximate $65,000,000. The emergency war revenue act, now producing about $85,000,000 per annum, goes off the statute books Dec. 31, increasing the deficit for the coming year by that amount. These two items carry the total of the Treasury shortage up to $325,000,000. If, therefore, the Garrison-Daniels program of increased expenditures for the national defense, which is understood to call for $75,000,000 for the Army and $100,000,000 for the Navy, should be adopted in its entirety Congress would be called upon to provide an additional round half billion of revenue.

The most serious aspect of this situation is due to the fact that, whether increased expenditures for military and naval purposes are authorized or not, Congress must almost immediately take steps to increase national revenues. It may be taken for granted that Congress will re-enact the emergency war revenue law for at least another year, but that is merely postponing the evil day. It goes without saying that if the war should end and the former volume of customs collections be restored the taxpayers would bitterly resent the continuance of the burdens imposed by the emergency act.

The issue is undeniably an awkward one for politicians to face, but there can be no doubt it will prove the part of wisdom to face it squarely and to provide revenue legislation adequate to meet not only current demands on the existing basis, but all the requirements involved in the President's program. Any policy having for its object the saving of a hundred million dollars or so at the expense of a reasonable program of preparedness is certain to prove disastrous to those responsible for its adoption.

Proposed Pittsburgh-Pacific Rate of 55 Cents

All the transcontinental railroads—the Northern roads being the Union Pacific, Great Northern, Northern Pacific and Chicago, Milwaukee & St. Paul and the Southern roads the Atchison, Topeka and Santa Fé and the Southern Pacific—have sent petitions to the Interstate Commerce Commission asking that they be allowed to make a through rate on finished iron and steel articles from Pittsburgh to Pacific coast points of 55c. per 100 lb., which is the same rate as now applies from Chicago to the Pacific coast. No doubt is felt at Pittsburgh that the Interstate Commerce Commission will allow the applicants to establish this rate and it is expected to go into effect within a week or not more than ten days. The 55c. rate from Pittsburgh to the Pacific coast will be extended to apply on tin plate.

The advantage to Pittsburgh iron and steel manufacturers of a lower all-rail rate to the Pacific coast is obvious. Considerable time is saved in shipping by rail instead of to New York and via the Panama Canal. Whether the rate from Pittsburgh to the Pacific coast via New York and the Panama Canal, which is now 56.9c., will be reduced to meet the proposed 55c. all-rail rate cannot be stated at this time. Unless it is reduced, it is certain that shipments of iron and steel articles from Pittsburgh to the coast, via the transcontinental roads, will be materially increased, both on account of the lower rate and of the time saved.

First Aid Contests at Perth Amboy

Under the auspices of the general safety committee of the Raritan Copper Works interesting first-aid contests were held at Perth Amboy, N. J., Sept. 18. Seven problems had been listed, and on the day of the contest the judges selected three on which ten teams competed. They were the following:

1. Simple fracture of right thigh. Compound fracture of left arm above elbow. Treat and carry on improvised stretcher.

2. Man has been run over by industrial locomotive and right arm cut off close to shoulder; profuse bleeding. Several ribs broken on the right side. Treat and carry on a stretcher.

3. Patient found on his back across a live electric wire, unconscious. Rescue and give artificial respiration for one minute. Then treat burns on the back and right upper arm. Carry 30 ft. on any improvised stretcher except one made of poles and coats.

The first prize was $125, the second prize $75 and the third prize $50. Six physicians made up the board of judges. Moving pictures were taken of the various events and these will be available for the use of manufacturing companies interested in safety work.

Reported Negotiations for Midvale Steel Company

Reports have been published in the past week of negotiations for the purchase of the Midvale Steel Company, Philadelphia, and $19,000,000 has been named as the basis. William A. Read & Co., 32 Nassau Street, New York, have been named as parties to the negotiations, representing a syndicate which would operate the plant to the greatest advantage to its stockholders, whether by taking war orders or otherwise. At present the Midvale company is making no munitions for the belligerents, though it has large contracts for the United States Government and for domestic shipbuilding companies building battleships. The outstanding stock of the company is $9,750,000, increased in February, 1910, from $750,000 by a 1200 per cent stock dividend.

PROGRESS IN MUNITIONS WORK

Inquiries Now for Larger Shells—Requirements in Brass Cartridge Cases

The situation in respect to shell production and other features of munitions work changes from week to week with bewildering rapidity. Whereas formerly the demand was principally for the 3-in., 3.29-in., 75-mm. and 82-mm. shells, the 4.5 and 6-in. caliber are now coming into prominence, and inquiries recently put out have been to an increasing extent for 9.2 in. and even 12-in. and 14-in. shells, with some intermediate sizes. Drawings for the largest shells have only just arrived in the United States and Canada and are being confidentially distributed for figuring upon. While some of these are understood to be for naval guns, they are of the high explosive field gun type. Armor-piercing shells do not seem to be in any demand on this side of the water, except as they may be called for by the United States Government.

New contracts for shrapnel and the smaller explosive shells are being quite generally held back for the manufacturers who have already established records for deliveries and can be depended upon as reliable sources of future supply. About 140 plants are now semi-officially stated to be engaged in shell manufacture in the United States, and many more are either just entering upon it or making preparations to do so.

SOME EARLY CONTRACTS NOT PROFITABLE

It is also reliably reported that some of the companies machining steel shell cases who entered upon their production early have forged considerably ahead of the rate of production guaranteed in their contracts and are accumulating reserve stocks of shells which they expect to place separately for spot delivery at a reasonable premium. In most instances these manufacturers took their orders at rates which, if not actually unremunerative, are far below what were subsequently offered and are now being freely paid. Hence the course outlined will help them to make up some of the deficiency. It is felt as something of an injustice, in fact, that eleventh-hour contractors are able to secure so much better terms than the old guard; but the condition is one that time will do much to correct.

Manufacturers of piercing, forming and drawing presses capable of handling forgings for shells at least as heavy as 9.2 in. have been asked directly from abroad, as well as from shops in this country having contracts under consideration, to submit estimates on complete two-press hydraulic units (or multiples of such units) for a production of 40 to 60 case forgings hourly, with the necessary high and low pressure pumps working up to pressures as high as 4000 lb. per sq. in., and accumulators, automatic knockout, control, etc. For presses capable of forming 6-in. shells and smaller, an incredibly large run of orders has already been filled, and others are being rushed to completion. The Russian commission and also buyers for Japanese account identified with Oriental trading companies are reported to be particularly urgent in the matter of shipments, and it is stated that they are offering substantial inducements for rush delivery. Plants having contracts for such equipment are working 24 hours daily under three shifts.

Any American or Canadian shop having heavy presses which can be put on piercing, drawing and forming operations for the larger shells can make very good terms for doing such work, even though only in relatively small lots; and manufacturers of such presses have been applied to for lists of their former customers who would probably be in a position to undertake it.

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BRASS CARTRIDGE CASES IN DEMAND

The greatest difficulty experienced by munitions contractors from abroad appears, however, to have been in securing a supply of brass cartridge cases to contain the impelling charge for the 3.29, 4.5, 6-in. and other shells already arranged for. For the first named this represents a case 15.158 in. in length, with a wall thickness 0.110 in. at the bottom, tapering to 0.068 about one-quarter of the way forward from the base, to 0.047 at the center and to 0.038 at the thin edge of the open end into which the steel case of the projectile fits. The larger sizes are in proportion. Besides finishing the exterior, which can be best done by plain grinding, the principal work on the case consists of recessing and threading the formed base for the percussion cap. The brass mixture called for by the specifications is 68 to 72 per cent Lake copper and 28 to 32 per cent of high-grade spelter. The case must be annealed, after drawing and finishing, at a temperature not exceeding 750 deg. C. Requirements for tensile strength are not very strict and the practice seems to vary considerably, from 30,000 lb. up. The drawing and forming of brass cartridge cases is not a difficult piece of work, but there is both on this continent and in Europe, outside probably of the central powers, a decided lack of suitable equipment for the purpose. Consequently manufacturers having the proper facilities can make very profitable use of them in this work. Great secrecy, however, attends all such operations, and outside of a limited circle they are known to very few, even in the immediate locality.

The Iron and Metal Markets

FURTHER PRICE ADVANCES

Heavy Demand for Steel for Large Shells

Railroad Buying Deliberate—Pig Iron Prices and Reserve Capacity

Export business is more distinctly the dominant factor in the steel trade than in any previous month of the war. Foreign rather than domestic demand caused an advance of $2 a ton in wire products on Saturday, and in the past week the inquiry for steel rounds and for billets and blooms from Canadian makers of munitions and from France has been on a scale well nigh incredible.

As a whole the market is moving upward, not uniformly nor yet with any spectacular developments, but in response to the special influences that have produced a scarcity of steel. This week sheets, iron bars, hard steel bars, shafting and bolts and nuts, in addition to wire products, have advanced, without any expansion in domestic consumption.

French purchases, as just announced, will now be of large squares which will be forged abroad, to make 9-in., 10¾-in., 12-in. and 14-in. shells, some of these last weighing about a ton. The inroads these demands will make on our steel supply, added to the new Russian requirements, are far beyond early calculations.

Domestic consumers of steel bars in particular find increasing difficulty in getting deliveries. In bars and in some other lines buyers are not being followed up in the usual way to get their requirements on the books and stocks in second hands are still small.

As a rule the railroads are moving deliberately. A few Western lines are inquiring at Chicago, including the Santa Fé which recently placed 30,000 tons of rails in Colorado for its lines west of Kansas City. The Erie has bought 20,000 tons for next year from the Illinois Steel Company and the New York Central is figuring with the mills. Even with car shortages in sight, the attitude of railroad buyers is decidedly conservative.

Recent barb-wire sales for export have been large, 5000-ton lots being common and some contracts running up to 20,000 tons. One inquiry is for 60,000 tons of painted barb wire, with shipments of 10,000 tons a month. Export barb wire has sold at 3c. and higher.

One interest has put bars, plates and structural steel at 1.40c., Pittsburgh, for this year. Plates are to be had at 1.30c. to $1.35c., Pittsburgh. Fabricating shops have succeeded here and there in working their prices up, though in Western districts work in sight is not large.

British rail mills are far from busy, but American competition is scarcely the reason, though it is alleged.

The booking of 200,000 boxes of tin plate for export by independent producers is reported. In view of the Scandinavian destination of much of this, the question is raised whether a British permit for shipment will be granted.

That the Tata works in India will make ferromanganese is the latest development in that market. British regulation will determine how much of this may be shipped to the United States. Thus far American makers have been able to get very little manganese ore from India.

The pig-iron market is quieter, but each week has its quota of new contracts. For Southern No. 2 foundry iron $11.50 at Birmingham has now become the minimum, with sales at $12 to $12.50 for next year. The Tennessee Company has advanced its price to $13.50 for the first half of 1916.

The displacement of eastern Pennsylvania basic pig iron by Ohio River iron, as in recent sales of 20,000 to 25,000 tons, is a matter of comment. The price was somewhat under $17.50 delivered.

Basic iron in the Central West has sold up to $15 at Valley furnace and $16 at Buffalo. With the present unprecedented demand upon open-hearth capacity, merchant furnacemen look for further buying of basic by steel makers.

The melt of foundry iron is increasing and at last the stove and malleable interests, which have long lagged, find some improvement. Pig-iron buying by stove foundries has been a feature both at St. Louis and Buffalo.

Foundries are moving cautiously in buying iron for next year and the next few weeks will try out the new prices of the furnaces. Pig-iron output is increasing steadily and the whole price situation will turn on the ability of 50 furnaces or more, that were in blast in early 1913 and are now idle, to get labor and ore for a new campaign and to make a profit at present prices.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

	At date, one week, one month and one year previous			
	Sept. 22, 1915.	Sept. 15, 1915.	Aug. 25, 1915.	Sept. 23, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	**$16.25**	$16.00	$15.50	$14.75
No. 2, Valley furnace...	14.75	14.75	14.50	13.00
No. 2 Southern, Cin'ti...	**14.40**	14.15	13.90	13.25
No. 2, Birmingham, Ala.	**11.50**	11.25	11.00	10.00
No. 2, furnace, Chicago*	**14.25**	14.00	13.50	13.00
Basic, del'd, eastern Pa.	**17.25**	17.00	15.50	14.00
Basic, Valley furnace...	**15.00**	14.75	14.50	13.00
Bessemer, Pittsburgh...	16.95	16.95	16.45	14.90
Malleable Bess., Ch'go*.	**15.00**	14.50	13.50	13.25
Gray forge, Pittsburgh...	14.70	14.70	14.45	13.65
L. S. charcoal, Chicago..	15.75	15.75	16.25	15.75
Billets, etc. Per Gross Ton:				
Bess. billets, Pittsburgh.	**24.50**	24.00	23.50	21.00
O.-h. billets, Pittsburgh.	**25.00**	24.50	24.00	21.00
O.-h. sheet bars, P'gh...	25.50	25.50	24.50	22.00
Forging billets, base, P'gh	32.00	32.00	29.00	26.00
O.-h. billets, Phila.....	30.00	30.00	32.00	23.40
Wire rods, Pittsburgh....	30.00	30.00	28.00	26.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	**1.509**	1.459	1.459	1.12
Iron bars, Pittsburgh....	1.35	1.35	1.30	1.15
Iron bars, Chicago.....	**1.35**	1.25	1.25	1.05
Steel bars, Pittsburgh...	1.35	1.35	1.30	1.20
Steel bars, New York....	1.519	1.519	1.519	1.36
Tank plates, Pittsburgh..	1.35	1.35	1.30	1.20
Tank plates, New York.	1.519	1.519	1.469	1.36
Beams, etc., Pittsburgh..	1.35	1.35	1.30	1.20
Beams, etc., New York..	1.519	1.519	1.519	1.36
Skelp, grooved steel, P'gh	**1.35**	1.30	1.30	1.20
Skelp, sheared steel, P'gh	**1.40**	1.35	1.35	1.25
Steel hoops, Pittsburgh..	1.35	1.35	1.35	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 22, 1915.	Sept. 15, 1915.	Aug. 25, 1915.	Sept. 23, 1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.90	1.90	1.90	1.95
Galv. sheets, No. 28, P'gh.	3.50	3.60	3.40	2.95
Wire nails, Pittsburgh..	1.75	1.65	1.65	1.60
Cut nails, Pittsburgh....	1.60	1.60	1.60	1.60
Fence wire, base, P'gh..	1.60	1.50	1.50	1.40
Barb wire, galv., P'gh..	2.60	2.50	2.40	2.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	$13.50	$13.50	$12.25	$12.00
Iron rails, Philadelphia..	18.50	18.50	17.00	14.00
Carwheels, Chicago	11.75	11.75	11.75	10.75
Carwheels, Philadelphia..	14.00	14.00	13.50	11.00
Heavy steel scrap, P'gh..	14.25	14.50	14.00	11.00
Heavy steel scrap, Phila.	15.00	15.00	14.00	10.50
Heavy steel scrap, Ch'go	11.75	11.75	11.75	9.00
No. 1 cast, Pittsburgh...	13.00	13.00	13.00	11.50
No. 1 cast, Philadelphia.	14.00	14.00	13.50	12.00
No. 1 cast, Ch'go (net ton)	10.00	10.00	10.00	9.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt....	$1.60	$1.60	$1.50	$1.60
Furnace coke, future....	2.00	2.00	1.75	1.75
Foundry coke, prompt...	2.15	2.15	2.00	2.00
Foundry coke, future...	2.40	2.40	2.25	2.15
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	17.87½	18.00	19.00	12.50
Electrolytic copper, N. Y.	17.75	17.75	16.00	11.87½
Spelter, St. Louis.....	13.00	13.75	12.25	5.20
Spelter, New York.....	13.25	14.00	12.50	5.35
Lead, St. Louis.....	4.32½	4.35	4.35	3.67½
Lead, New York.....	4.50	4.50	4.50	3.85
Tin, New York.....	33.00	33.37½	33.75	31.60
Antimony, Asiatic, N. Y..	27.50	27.50	28.50	9.00
Tin plate, 100-lb. box, P'gh	$3.15	$3.15	$3.10	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c., on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.35c. base net cash, thirty days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3-16 in....	.10
Gages under 3-16 in. to and including No. 8....	.15
Gages under No. 8 to and including No. 9.....	.25
Gages under No. 9 to and including No. 10....	.30
Gages under No. 10 to and including No. 12....	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers: Fence wire, Nos. 9 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, $1.60; galvanized, $2.30. Galvanized barb wire and staples, $2.60; painted, $1.90. Wire nails, $1.75. Galvanized nails, 1 in. and longer, $1.75 advance over base price; shorter than 1 in., $2.25 advance over base price. Woven wire fencing, 69½ per cent off list for carloads, 68½ off for 1000-rod lots, 67½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized ...	2.55	2.60	2.65	2.70	2.80	2.90	3.20	3.30

Wire Rods.—Bessemer, open-hearth and chain rods, $30.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 1.35c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft., to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	72	46½	⅛ and ¼	64	37
½	76	59½	⅜	64	37
¾ to 3	79	63½	½	68	47
			¾ to 2½	71	52

Lap Weld

2	76	60½	1¼	55	36
2½ to 6	78	62½	1½	66	47
7 to 12	76	58½	2	67	49
13 and 14	62½	..	2½ to 4	69	52
15	60	..	4½ to 6	69	52
			7 to 12	67	50

Reamed and Drifted

1 to 3, butt	77	61½	1 to 1½, butt	69	50
2, lap	74	58½	2, butt	69	50
2½ to 6, lap	76	60½	1¼, lap	53	34
			1½, lap	64	45
			2, lap	65	47
			2½ to 4, lap	67	50

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	67	49½	⅜	61	43
½	72	58½	½	66	51
¾ to 1½	76	62½	¾ to 1½	70	53
2 to 3	77	63½	2 and 2½	71	54

Lap Weld, extra strong, plain ends

2	73	57½	1½	65	48
2½ to 4	75	59½	2	67	49
4½ to 6	74	58½	2½ to 4	69	52
7 to 8	68	50½	4½ to 6	68	51
9 to 12	63	45½	7 to 8	61	44
			9 to 12	56	39

Butt Weld, double extra strong, plain ends

½	62	48½	½	56	40
¾ to 1½	65	51½	¾ to 1½	59	43
2 to 2½	67	53½	2 and 2½	61	45

Lap Weld, double extra strong, plain ends

2	63	49½	2	57	40
2½ to 4	65	51½	2½ to 4	59	45
4½ to 6	64	50½	4½ to 6	58	44
7 to 8	58	40½	7 to 8	51	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, in effect from July 16, 1915:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	63	1¾ and 2 in.	50
2¼ in.	60	2¼ in.	47
2½ to 2¾ in.	66	2½ and 2¾ in.	54
3 and 3¼ in.	71	3 and 3¼ in.	58
3½ and 4½ in.	72	3½ and 4½ in.	60
5 and 6 in.	65	5 and 6 in.	54
7 to 13 in.	62		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.45 to 1.55
Nos. 9 to 10	1.50 to 1.60
Nos. 11 and 12	1.55 to 1.65
Nos. 13 and 14	1.60 to 1.70
Nos. 15 and 16	1.70 to 1.80

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.55
No. 12	1.55
Nos. 13 and 14	1.60
Nos. 15 and 16	1.65
Nos. 17 to 21	1.70
Nos. 22 and 24	1.75
Nos. 25 and 26	1.80
No. 27	1.85
No. 28	1.90
No. 29	1.95
No. 30	2.05

Galvanized Sheets of Black Sheet Gage

	Cents per lb.
Nos. 10 and 11	2.50 to 2.65
No. 12	2.60 to 2.75
Nos. 13 and 14	2.60 to 2.75
Nos. 15 and 16	2.70 to 2.85
Nos. 17 to 21	2.85 to 3.00
Nos. 22 and 24	3.05 to 3.20
Nos. 25 and 26	3.20 to 3.35
No. 27	3.35 to 3.50
No. 28	3.50 to 3.65
No. 29	4.25 to 4.40
No. 30	4.50 to 4.65

Pittsburgh

PITTSBURGH, PA., Sept. 21, 1915.

The very hot weather last week interfered materially with the output of iron and steel, and in a time of pressure like this, when the mills are being driven to their utmost capacity, any falling off in production is seriously felt. An item of interest is the proposed fixing of a 55c. freight rate on articles of finished iron and steel from Pittsburgh to the Pacific coast by the all-rail haul, against the present rate of 73.9c. For a long time Chicago has enjoyed a 55c. rate to the coast, and it is proposed to make this rate apply from Pittsburgh also. The transcontinental lines will put the matter up to the Interstate Commerce Commission within a few days. Conditions in the steel trade are about as active as they could possibly be, and there are no signs of any falling off in demand or in operations, the latter being at fully 100 per cent of capacity. The railroads are now awake to the filled-up condition of the steel mills, and are feeling the market on materials, but they find it will be almost impossible to get any deliveries before early next year. Pig iron has quieted down, but prices are very strong. There is not enough open-hearth steel to go around, and Bessemer is being substituted in a good many cases. Wire products have been put up $2 per ton, and wire fencing has been lowered one point in discounts. Blast-furnace coke is showing a good deal of activity, consumers desiring to cover for first half of 1916, and the coke makers are trying to get more money. Scrap is lagging in demand and prices are easier. If the railroads come in and place liberal orders for track materials, this would assure present active conditions in the steel business probably through the first half of next year. More new work in the way of increasing iron and steel capacity is under way than at any time in two years, and the foundries and manufacturers of rolling-mill and steel-works machinery in this district are busier than at any time for many months. There promises to be quite an increase in open-hearth steel capacity within the next year.

Pig Iron.—There is a fair amount of new inquiry for Bessemer and basic iron, but the market is not so active as two or three weeks ago. A consumer in the Wheeling district is inquiring for 6000 tons of basic for last quarter delivery. We note sales of about 3200 tons of basic iron for this year's delivery at $15, Valley furnace, and a local interest sold last week 4000 tons of standard Bessemer iron for shipment to Italy at $16, Valley furnace. There is a fair amount of new inquiry for foundry iron, but nearly all consumers are covered over the remainder of this year, and furnaces do not seem anxious to sell for delivery into 1916, except at attractive prices. We quote: Standard Bessemer iron, $16; basic, $15; malleable Bessemer, $14.50 to $14.75; gray forge, $13.75 to $14, and No. 2 foundry, $14.75 to $15, all at Valley furnace, the freight for delivery in the Cleveland or Pittsburgh district being 95c. per ton.

Billets and Sheet Bars.—It is almost impossible to get open-hearth steel billets at any price, and some consumers are buying Bessemer instead. We note a sale of 700 tons of Bessemer billets at $25, Pittsburgh. There is not much new demand for sheet bars, as some of the sheet mills are not very busy and the tin-plate mills report a material falling off in specifications. Some mills that have sheet bars bought are trying to get the producers to substitute billets instead, so that they can re-sell them, but this is being refused, as the steel mills want to take advantage themselves of present high prices. There is quite an active demand for forging billets. Sales of several lots ranging from 100 to 150 tons have been made at $32 to $33 for ordinary carbons, while for carbons running from 0.65 to 0.75 as high as $37 has been paid. We quote Bessemer billets, $24.50; open-hearth billets, $25; Bessemer sheet bars, $25, and open-hearth sheet bars, $25.50, maker's mill, Youngstown or Pittsburgh, prices of steel at the two points being practically the same. We quote forging billets at $32 to $33 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra. Axle billets are held at $29 to $30.

Ferroalloys.—A leading consumer in the Youngstown district has bought 2000 tons of foreign 80 per cent ferromanganese for last quarter delivery on the basis of about $100, seaboard. No guarantee was given as to deliveries. New inquiry for ferromanganese is more active, showing that stocks in the yards of consumers are being worked off and they are getting more anxious about a new supply. We quote foreign 80 per cent ferromanganese at $100 to $110, seaboard, and domestic at $110 to $112.50, Pittsburgh. We note a sale of 10 tons of ferrotungsten to a large Eastern consumer at $4.25 per pound of contained tungsten. We quote Bessemer ferrosilicon as follows: Ten per cent, $20; 11 per cent, $21; 12 per cent, $22; 13 per cent, $23, and 14 per cent, $24, all f.o.b. cars at furnace, Ashland, Ky., New Straitsville, Ohio, or Jackson, Ohio, each of these points having a freight rate of $2 per gross ton to Pittsburgh. We quote 20 per cent spiegeleisen at $27 at furnace. We note a sale of 2000 tons of 14 per cent Bessemer ferrosilicon at $25 at furnace, equal monthly deliveries over the first half of 1916. We quote ferrotitanium at 8c. per pound in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots. We quote ferrovanadium at $2 to $2.25 per pound of contained vanadium, prices depending somewhat on the size of the order.

Steel Rails.—Only small orders for standard sections are being placed, these running from 300 tons to 1000 tons, for delivery this year. The new demand for light rails is active, the Carnegie Steel Company having received new orders and specifications in the past week for over 4000 tons. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth stock, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows: 25 to 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c.; 8 and 10 lb., 1.40c. in carload or larger lots, 5c. advance being charged for less than carload lots.

Structural Material.—New inquiry is more active and a good deal of work is in sight. The American Bridge Company has taken about 1500 tons for new steel buildings for the Shelby Steel Tube Company, Ellwood City, Pa., 600 tons for a new freight station for the Baltimore & Ohio Railroad in this city, and 1500 tons for new steel buildings for the B. F. Goodrich Company, Akron, Ohio. The Fort Pitt Bridge Works has taken some steel buildings for the United Stee[illegible]

Company, Canton, Ohio, upward of 2000 tons, and the Pittsburgh-Des Moines Steel Company has taken 500 tons for the Bailey high school in Pittsburgh. Prices are very firm. We quote beams and channels up to 15 in. at 1.35c. for delivery over the remainder of this year.

Plates.—The only new active inquiry out for cars is one from the Illinois Central for 2000 box cars. The Pressed Steel Car Company is filling the order for 7000 cars for Russia at the rate of about 65 cars per day, and will complete this contract this year. The general demand for plates is heavy, and nearly all the mills are running to full capacity and have a good deal of work ahead. We quote ¼-in. and heavier tank plate at 1.35c., f.o.b. Pittsburgh, but on a desirable order and where early delivery is not urgent, 1.30c. is being named by a few of the smaller mills.

Sheets.—Mills report a better demand for light black sheets. The call for blue annealed sheets is quite heavy, but for galvanized is dull, owing to the sharp fluctuations in prices of spelter. The demand for enameled sheets from the electrical companies is still active and these are commanding good prices. The recent decline in spelter has again unsettled prices on galvanized sheets, which are lower, several mills offering from stock as low as 3.45c. for No. 28. Minimum prices are 1.90c. on No. 28 black sheets, with possibly a few mills naming 1.85c.; 1.50c. on Nos. 9 and 10 blue annealed, and 3.50c. to 3.65c. on galvanized, the lower price being shaded by a few sellers. We quote No. 28 galvanized sheets at 3.50c. to 3.65c.; No. 28 Bessemer black sheets, 1.90c.; Nos. 9 and 10 blue annealed, 1.50c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 and 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advance for small lots from store.

Tin Plate.—This is the off season in the tin-plate trade, so that specifications have fallen off materially, but the leading mills still have two to three weeks' work ahead. Export shipments are fairly heavy. Most of the leading mills are operating full, but will no doubt slow down in the near future. As yet nothing official has been given out as to the price of tin plate for 1916 delivery, but this is expected to be announced in a short time. Prices are firm and we quote 14 x 20 coke plates for domestic trade at $3.15 to $3.25 per base box, f.o.b. Pittsburgh, in small lots. There is very little domestic demand.

Wire Rods.—The advance of $2 per ton in wire products, effective Sept. 18, has naturally stiffened prices on rods, of which the supply is limited. Two local makers have been out of the market for some time as sellers, but new inquiry is heavy. One inquiry came out last week for 2000 tons from England, and another for 800 tons from Canada, but the high tariff into Canada prevents any rods from going there from this country. We quote Bessemer, open-hearth and chain rods at $30, f.o.b. Pittsburgh.

Wire Products.—Effective Sept. 18, prices on wire products were advanced $2 per ton and on woven wire fencing, one point. This advance was not made on account of the active domestic demand, but largely because of the heavy export business and the fact that the wire mills are jammed with orders and have their product well sold up for the remainder of this year. The advance will probably also have the effect of stimulating specifications against contracts placed some time ago for wire nails on the basis of $1.60 and plain wire at $1.45. It is stated that all the contracts on the $1.55 basis for wire nails have been shipped out or canceled. Prices to the large trade are as follows: Wire nails, $1.75; galvanized nails 1 in. and longer taking an advance over this price of $1.75, and shorter than 1 in. $2.25. Plain annealed wire is $1.60; galvanized barb wire and fence staples, $2.60; painted barb wire, $1.90; polished fence staples, $1.90, all f.o.b. Pittsburgh, with freight added to point of delivery, terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 69½ per cent off list for carload lots, 68½ per cent for 1000-rod lots, and 67½ per cent for small lots, f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—Makers report a fairly active demand, but most consumers are covered for the remainder of this year and some into first quarter of next year. Prices are very firm and on some orders as high as $3.10 base is being quoted. Export inquiry is fairly heavy, several large lots being in the market. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., $3 to $3.10 delivered. Extras, which are standard among all mills, are as follows.

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Skelp.—New demand remains quiet, but prices are firm and slightly higher, due to the scarcity and high price of steel. Prices have been advanced $1 per ton, and we now quote grooved steel skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.75c. to 1.80c., and sheared iron skelp, 1.85c. to 1.90c., delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—There is no new demand, and specifications against contracts placed early this year are not coming in very freely, as the railroads are doing little new track laying. None of the spike mills is operating to full capacity. We quote standard sizes of railroad spikes at $1.50, and small railroad and boat spikes at $1.60 per 100 lb., f.o.b. Pittsburgh.

Rivets.—Domestic demand for boiler rivets is better and export inquiry is still very heavy. One local maker shipped last week two carloads to India. We quote buttonhead structural rivets at $1.60 to $1.65, and conehead boiler rivets at $1.70 to $1.75, in carload lots, per 100 lb., f.o.b Pittsburgh, smaller lots bringing about 10c. advance.

Hoops and Bands.—The new demand is not active, as most consumers are covered over the remainder of this year, but some contracts for hoops and bands have been placed for delivery in first quarter of 1916. Prices are very firm. We quote steel hoops at 1.35c. to 1.40c.; steel bands, 1.35c., with extras as per the steel bar card, for delivery over the remainder of this year. The season in cotton ties is over.

Iron and Steel Bars.—There is no let-up in the heavy export demand for steel rounds, but local steel-bar mills are now so well filled that they are not able to figure on export inquiries, as they cannot make the deliveries wanted. One order for 7200 tons of rounds was placed with a local mill last week, and it is said that close to 3c. per pound was paid. Merchant steel-bar mills report specifications heavy and they are getting out every pound of bars possible and shipping as fast as made. The 1.40c. price on steel bars is getting more prominent, and while consumers are covered for the remainder of this year, it looks now as though steel bars for first quarter of 1916 will not be under 1.40c. It is stated a few small contracts for that delivery have been made at that price. Bar-iron mills report new demand better and they have more orders on their books now than for some months. Some former users of open-hearth bars are now using Bessemer stock, as more prompt deliveries can be had. We quote steel bars at 1.35c. for delivery over remainder of the year; refined iron bars, 1.40c. to 1.45c.; common iron bars, 1.35c., and railroad test iron bars, 1.45c. to 1.50c., all f.o.b. Pittsburgh.

Carwheels.—The Forged Steel Wheel Company, Butler, Pa., and the Schoen steel wheel works of the Carnegie Steel Company are filled up with orders over the remainder of this year. These two concerns are furnishing the wheels and axles for the 7000 steel cars

being built by the Pressed Steel Car Company for Russia. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at $16, and standard 36-in. passenger, the same bore, at $22.50 per wheel, f.o.b., Pittsburgh.

Shafting.—New demand continues heavy. The shafting makers are running to their utmost capacity and are sold up for the remainder of this year, with some contracts running into 1916. In the case of shafting it is more a question now where to get it than of price. The Columbia Steel & Shafting Company, Carnegie, Pa., has lowered its discounts two points, now quoting 62 per cent off in carloads and 57 in less than carloads. As yet other makers have not adopted these higher prices, but may do so before long. Prices are very strong, and we quote cold-rolled shafting at 64 per cent off in carloads and 59 per cent in less than carloads, f.o.b. Pittsburgh.

Nuts and Bolts.—Both foreign and domestic demand are very heavy and makers of nuts and bolts say they have not been so busy in many months. Export shipments are heavy and in most cases higher prices are being obtained on foreign business than for domestic. Discounts to the large trade are as follows:

Machine bolts, h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled, 75, 10, 10 & 5; smaller and shorter, cut, 75, 10 & 10; larger or longer, 75 & 10. Machine bolts, C. P. C. & T. nuts, ⅜ x 4 in., smaller and shorter, 75, 10 & 5; larger or longer, 70, 10 & 7½. Common carriage bolts, ⅜ x 6 in., smaller and shorter, rolled, 75, 10, 10 & 5; smaller and shorter, cut, 75, 10 & 5; larger or longer, 75 & 5. Bolts without nuts, 6 in. and shorter, extra 10; longer lengths, extra, 5. Blank bolts, 75 & 10. Bolt ends with h. p. nuts, 75 & 10; C. P. C. & T. nuts, 70, 10 & 7½. Gimlet point coach screws and cone point lag screws, 80 & 15. Nuts, blank or tapped, h. p. square, 6c. lb. off; h. p. hexagon, 6.70c. lb. off; C. P. C. & T. square, 5.50c. lb. off; hexagon, ⅝ in. and up, 7c. lb. off; smaller, 7.50c. lb. off; C. P. plain, square, 5.40c. lb. off; hexagon, 5.80c. lb. off; C. P. semi-finished, hexagon, ⅝ in. and up, 85 & 10; smaller, 85, 10 & 10.

U. S. S. Cold Punched Blank and Tapped, Chamfered, Trimmed and Reamed

½ in. and smaller, hex.....7.25c. per lb. off
⅝ in. and larger, hex.....6.75c. per lb. off
Square, all sizes .....5.30c. per lb. off

Semi-Finished Tapped

½ in. and smaller, hex.....85 & 5 off
⅝ in. and larger, hex.....85 off

Black Bulk Rivets

7/16 x 6½, smaller and shorter.....80-10 off

Package Rivets, 1000 Pcs.

Black, metallic tinned and tin plated....75-10-10 off

Merchant Steel.—The new demand for seasonable steels is heavy and mills report specifications very active. Shipments this month are fully up to August and may exceed it. Prices are very firm. On small lots we quote: Iron finished tire, ½ x 1½ in., and larger, 1.60c. base; under ½ x 1½ in., 1.75c.; planished tire, 1.80c.; channel tire, ¾ to ⅞ and 1 in., 2.10c. to 2.20c.; 1 x ⅛ in. and larger, 2.20c.; toe calk, 2.20c. to 2.30c., base; flat sleigh shoe, 1.95c.; concave and convex, 2c.; cutter shoe, tapered or bent, 2.50c. to 2.60c.; spring steel, 2.20c. to 2.30c.; machinery steel, smooth finish 2c.

Wrought Pipe.—A project is under way to run a natural-gas line between Canton and Youngstown, Ohio, and about 50 miles of 14 or 16-in. pipe will be needed, which will likely be placed with one or the other of the two Youngstown mills. The new demand for wrought iron and steel pipe is quiet and for oil-well supplies is very dull. Discounts on both iron and steel pipe, especially on galvanized, are more or less shaded.

Boiler Tubes.—The new demand for locomotive tubes is reported by the mills to be more active than for some time, but for merchant tubes is very quiet. Discounts are more or less shaded.

Coke.—Several contracts for blast-furnace coke on a sliding scale have been closed on the basis of $1.75 minimum for the coke and $13 minimum for the basic iron. With each advance in the price of basic iron, one-fifth of such advance is added to the price of the coke. In other words, if basic iron should go to $14 the price of the coke on these contracts would advance 20c. or to $1.95 per net ton at oven. An inquiry is in the market from an Eastern consumer for 5500 tons of blast furnace coke per month for last quarter of this year and first half of 1916. A number of contracts for blast furnace coke expire Dec. 31, and negotiations are on to renew these on a sliding scale basis, but, as the coke makers want more money for their coke than they get on present contracts, this is holding up the closing of negotiations. The new demand for foundry coke is better, and the outlook is that higher prices will be paid on contracts for first half of next year than was paid on contracts expiring at the close of this year. We quote standard makes of blast furnace coke at $1.65 to $1.75 for prompt shipment, and on contracts for last quarter of this year and first quarter of 1916 at $2 per net ton at oven. We quote best grades of 72-hr. foundry coke at $2.10 to $2.25 for prompt shipment, and $2.40 to $2.50 on contracts for remainder of this year, all per net ton at oven. The Connellsville *Courier* reports the output of coke for the week ended Sept. 11 as 387,703 net tons, an increase over the previous week of 8231 tons. The Kentucky Solvay Coke Company has made a contract to furnish the Marting Iron & Steel Company, which has two blast furnaces at Ironton, Ohio, with 150,000 tons of coke per year over a period of five years, on a sliding scale basis.

Old Material.—The new demand for scrap from consumers has fallen off, and prices on nearly all grades are easier to the extent of about 25c. per ton. At the same time, dealers are not anxious to sell unless they have the material, and it is hard to pick up scrap unless good prices are paid for it. The Pennsylvania Railroad's steel scrap, about 2000 tons, was taken by a local consumer at $14.50, or perhaps higher. The new demand for low phosphorus melting stock has quieted down, as consumers have bought heavily lately, and are covered for some time ahead. In the past week there have been sales of probably 2000 tons of low phosphorus melting stock at $19 to $19.50, delivered, also a sale of 1500 tons of heavy-steel melting scrap at about $14.50, delivered. Busheling scrap, borings and turnings are off about 25c. per ton, and consumers are covered for some time ahead. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$14.25 to $14.50
Compressed side and end sheet scrap	13.00 to 13.25
No. 1 foundry cast	13.00 to 13.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	11.50 to 11.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.25 to 14.50
No. 1 railroad malleable stock	12.25 to 12.50
Railroad grate bars	8.75 to 9.00
Low phosphorus melting stock	18.50
Iron car axles	18.50 to 19.00
Steel car axles	16.00 to 16.50
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	11.50
No. 2 busheling scrap	8.50
Machine shop turnings	8.50
Old carwheels	13.00 to 13.50
Cast-iron borings	9.25
*Sheet bar crop ends	13.50 to 14.00
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

The Pennsylvania Steel Company has blown in its new No. 5 blast furnace at Steelton, Pa. It has a daily capacity of 500 tons, is strictly modern in construction and is equipped with a skip hoist for charging. Two Mesta gas blowing engines, the largest in the United States, furnish air. R. V. McKay, superintendent of blast furnaces, is personally in charge of the new furnace. There are now four stacks in at Steelton, Nos. 1, 3, 4 and 5. The company is considering blowing out the old No. 3 stack and remodeling it to bring its capacity up to 500 tons.

Lawrence furnace of the Marting Iron & Steel Company, at Ironton, Ohio, was blown in Sept. 9 to make basic and malleable pig iron. Ironton furnace of the same company was blown in Sept. 11 on foundry iron. Union furnace at Ironton will probably be blown in at an early date.

Chicago

CHICAGO, ILL., Sept. 22, 1915.—(*By Wire.*)

Quotations on 1916 rails have been taken by several roads, and in the case of the Santa Fé a part of its requirements, to the amount of 30,000 tons, has been bought. Although this inquiry suggests an unusually early covering, the railroad attitude is still decidedly conservative. The market as a whole is moving steadily upward, price advances being particularly noted with respect to the minor products, which are feeling the influence of raw material scarcity rather than greatly improved demand. Sheets, iron and hard steel bars, light rails, shafting, bolts and nuts, wire and cast-iron pipe are quoted at advances of from 50c. to $2 per ton. Western fabricators are in a somewhat easier position as to tonnage, and prices show improvement but there are few projects of size in sight. Bar-iron mills have advanced their prices $2 per ton, but the available business can be handled with 60 per cent operations. Specifications covering the heavy products are moderately heavy, but the tonnage of special rounds is steadily increasing. Demand for forging billets is more insistent with greater scarcity, and the price is now $32. In the scrap market the strength that was anticipated failed to materialize. Where it was expected to establish $12.50 for heavy melting steel, $12 appears to have been the highest price recently paid by consumers. Interest in pig iron has not abated and prices are at the high level reached last year.

Pig Iron.—The ruling prices in this market are now $14.25 for Northern No. 2 foundry, $15 for malleable and $14 for basic, although the last important transaction in basic was closed at $13.50. These prices are for last quarter delivery, an advance of 50c. applying on shipments after Jan. 1. While there are few sales of malleable recorded at $15, one of 750 tons being noted, a circumstance probably due as much to the prior heavy purchases as to the high price, an indication of the general strength of the market is to be had in the fact that the buying of iron generally has continued at the higher level of prices. Sales of foundry iron aggregating nearly 5000 tons at the above prices are reported. For Southern, $11.50, Birmingham, is being done for prompt shipment, with some sellers asking $12. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$15.75 to $16.25
Lake Superior charcoal, No. 1	16.25 to 16.75
Lake Superior charcoal, No. 6 and Scotch	16.75 to 17.25
Northern coke foundry, No. 1	14.75 to 15.25
Northern coke foundry, No. 2	14.25 to 14.75
Northern coke foundry, No. 3	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	16.00 to 16.50
Southern coke, No. 2 f'dry and 2 soft	15.50 to 16.00
Malleable Bessemer	15.00
Standard Bessemer	17.25
Basic	13.75 to 14.00
Low phosphorus	24.00 to 24.50
Silvery, 8 per cent	19.50 to 19.75
Silvery, 10 per cent	20.00 to 20.25

(*By Mail*)

Rails and Track Supplies.—Inquiry for rails for 1916 has materialized in this market, covering a total of about 100,000 tons and representing requirements of several roads. The earliness with which this interest is appearing is perhaps the best evidence of its significance, but none of the roads is asking for any large tonnage. The Santa Fe has placed its order for 30,000 tons of rails for its lines west of Kansas City with the Colorado Fuel & Iron Company. Negotiations covering the smaller quantity of rails which will be required for its eastern division are understood to have been begun at Chicago. Prices of light rails have been advanced nearly $2 per ton, more as the result of higher prices for raw materials than any improvement in demand. We quote standard railroad spikes at 1.65c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, $30, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.16c.; 16 to 20 lb., 1.21c.; 12 lb., 1.26c.; 8 lb., 1.31c.; angle bars, 1.50c., Chicago.

Structural Material.—With the exception of the terminal construction at Kansas City, the completion of which has been so long delayed, the prospect in this market is decidedly bare of large work. Although a better situation has existed within the past two weeks in the matter of structural tonnage in the fabricating shops, conditions here do not have the appearance of supporting the statements regarding capacity employed, as reported from time to time for the country at large. Local work placed last week included 600 tons for a Chicago & Northwestern Railway office building, taken by the American Bridge Company; 200 tons for the Presbyterian Hospital at Chicago, awarded to the Vierling Steel Works, and 228 tons for subway construction for the Chicago & Northwestern Railway, secured by the Chicago Bridge & Iron Company. The Gage Structural Steel Company, Chicago, has taken 1000 tons of structural steel for refrigerating plants in South America. Prices for fabricated steel are generally moving upward, but much work is still being taken at very low prices, the large amount of highway bridge construction in particular going at low figures. We quote for Chicago delivery of plain material from mill 1.539c.

We quote for Chicago delivery of structural steel from stock 1.90c.

Plates.—There is a smattering of car business, but none of the orders recently closed represents any considerable tonnage of plain material. Local mills, however, are comfortably situated and the market appears to be quite uniformly on the basis of 1.30c., Pittsburgh. We quote for Chicago delivery of plates from mill 1.489c.

We quote for Chicago delivery of plates from store 1.90c.

Sheets.—Increasing strength is manifested from week to week in the prices of sheets. For blue annealed, prices range from 1.50c. to 1.55c., depending upon the sizes and mill schedules. Prices for black sheets are likewise advancing, the strength of the market depending upon the scarcity of raw steel rather than the greater demand for the finished material. Prices for galvanized sheets are spread out through a considerable range, sales being noted at prices equivalent to 3.50c., Pittsburgh, while other quotations are noted as high as 3.75c. We quote for Chicago delivery from mill, No. 10 blue annealed, 1.689c. to 1.739c.; No. 28 black, 2.139c. to 2.189c.; No. 28 galvanized, 3.689c. to 3.789c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.10c.; No. 28 black, 2.55c. to 2.65c.; No. 28 galvanized, 4.35c.

Bars.—The advance in the cost of scrap, together with the higher scale of prices obtaining for steel bars, has lifted the bar-iron market to the basis of 1.35c. at mill. While there is some improvement in tonnage also, the mills at Chicago are operating at scarcely more than 60 per cent of capacity. Steel-bar specifications as a whole are not exceptionally heavy, although in special lines the demand is excellent. New orders for large rounds are coming in from week to week, several thousand tons being noted as placed by Western agricultural implement manufacturers who have taken shrapnel contracts. There is a very considerable tonnage of this ammunition steel still pending, and some of the mills are endeavoring to reserve accommodations for customers who are negotiating business of this character. We quote mill shipment, Chicago, as follows: Bar iron, 1.35c.; soft steel bars, 1.539c.; hard steel bars, 1.35c.; shafting, in carloads, 65 per cent off; less than carloads 60 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 1.80c.; bar iron, 1.80c.; reinforcing bars, 1.75c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 54 per cent off.

Rivets and Bolts.—Specifications for bolts have been coming in to the works in volume sufficient to improve operating conditions markedly, and there is less inclination to seek business with offers of concessions. There is also apparent a disposition to take advantage

of the higher prices prevailing for bars, and on the larger sizes of bolts, in particular, better prices are the rule. We are revising quoted discounts as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 75-10; gimlet point coach screws, 80-15; hot pressed nuts, square, $5.80 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 1.75c. to 1.85c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 1.95c.; boiler rivets, 2.05c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ¾ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—Another advance of $2 per ton applicable to all wire products is announced. The differential for galvanizing remains unchanged. Quotations to jobbers, per 100 lb., are as follows: Plain wire, No. 9 and coarser, base, $1.789; wire nails, $1.939; painted barb wire, $2.089; galvanized barb wire, $2.789; polished staples, $2.089; galvanized staples, $2.789, all Chicago.

Cast-Iron Pipe.—An award of 1000 tons has been made at Kansas City to the American Cast Iron Pipe Company, but the business at Macon, Mo., has not yet been let. At Middletown, Ohio, 350 tons is to be bought and at St. Charles, Ill., 285 tons. Prices have been advanced 50c. per ton and we quote as follows, per net ton, Chicago: Water pipe, 4 in., $27; 6 in. and larger, $25, with $1 extra for class A water pipe and gas pipe.

Old Material.—It has been apparent for some time that the general basis of prices for all grades of scrap has, in a measure, been predicated upon the expected price at which consumers of heavy melting steel would re-enter the market. Speculation had suggested prices ranging from $12.50 to $13, Chicago, but last week's purchases by a leading melter, totaling something in excess of 10,000 tons at prices from $11.75 to $12, proved disappointing. Inquiry is noted for all-steel carwheels at prices which suggest a special demand, while the selling of shrapnel turnings has also been an interesting feature. Railroad lists this week include 2400 tons offered by the Burlington, 2100 tons by the St. Paul and about 800 tons each by the Chicago Great Western and the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$13.50 to	$14.00
Relaying rails	19.50 to	20.50
Old carwheels	11.75 to	12.00
Old steel rails, rerolling	13.25 to	13.75
Old steel rails, less than 3 ft.	13.00 to	13.50
Heavy melting steel scrap	11.75 to	12.00
Frogs, switches and guards, cut apart	11.75 to	12.00
Shoveling steel	11.50 to	11.75
Steel axle turnings	9.50 to	9.75
	Per Net Ton	
Iron angles and splice bars	$13.50 to	$13.75
Iron arch bars and transoms	13.75 to	14.25
Steel angle bars	10.75 to	11.25
Iron car axles	15.50 to	16.00
Steel car axles	15.25 to	15.75
No. 1 railroad wrought	11.00 to	11.50
No. 2 railroad wrought	10.50 to	10.75
Cut forge	10.50 to	10.75
No. 1 busheling	9.00 to	9.50
No. 2 busheling	7.25 to	7.50
Pipes and flues	8.50 to	9.00
Steel knuckles and couplers	11.25 to	11.75
Steel springs	11.50 to	12.00
No. 1 boilers, cut to sheets and rings	8.50 to	8.75
Boiler punchings	10.00 to	10.50
Locomotive tires, smooth	11.00 to	11.50
Machine shop turnings	6.75 to	7.00
Cast borings	6.50 to	7.00
No. 1 cast scrap	10.00 to	10.50
Stove plate and light cast scrap	8.75 to	9.00
Grate bars	8.50 to	8.75
Railroad malleable	10.25 to	10.75
Agricultural malleable	9.00 to	9.50

Pig-iron output of New South Wales in 1914, according to the annual report of the country's Department of Mines, was in excess of that of 1913—75,150 gross tons against 46,563 tons. The zinc concentrates and spelter produced were 359,310 tons in 1914 and 506,661 tons in 1913; tungsten ore was 139 tons in 1914 and 126 tons in 1913. The coke output was 304,800 tons in 1914 and 298,612 tons in 1915.

Philadelphia

PHILADELPHIA, PA., Sept. 21, 1915.

The steel mills are to-day more comfortably filled than they have been in several years, and the dominant question with many consumers is where can they obtain steel. Foreign inquiry is an even greater factor than it has been, while the railroads are more active in their purchases of locomotives, cars and bridge work. All along the line the drift is toward higher prices, but these are irregular because of the excellent demand, which in some cases carries with it offers of premiums for desired deliveries. The activity in structural material in this territory is notable, considering the flatness of only a few months ago. The bar trade continues to be largely concerned with the call for large rounds. Makers of billets have none too many to sell and prices are strong. A further sale of Western basic pig iron has been made in this territory, the quantity being 6000 tons, although the buyer sought 9000 tons. Foundry iron is somewhat dull for this year's delivery, but contracts for next year are being quietly made. Prices are firmly held at the recent advances. The general opinion is that contract furnace coke for 1916 delivery will settle at about $2.25 at oven. Old material is less active, but as a rule prices are maintained.

Pig Iron.—Buying of foundry grades for delivery the remainder of this year has slackened up for the reason that the requirements of consumers are covered, while buying for next year is somewhat spotty, presumably because of the higher prices which are asked. At the same time that there is more buying for the same quarter than is coming to the surface can be safely asserted, for negotiations are very quietly conducted. All books are now open for first quarter business. The quotations for all deliveries are firm. Jobbing foundries are reported to be busier. If there is any eastern Pennsylvania No. 2 X to be had at $16 it is difficult to find, $16.25 being nearer the actual minimum. One prominent seller quotes $16.29, delivered, as his lowest price to the end of the year, with first quarter delivery $1 higher. The range of prices quoted by other sellers runs from $16.50 to $17, delivered. On one definite inquiry $16.89 was quoted. Other sellers say that the range might be stated at $16 to $16.75, though where the minimum might be found they do not say, merely asserting that it might be possible. The Sanitary Company of America, Bloomfield, Pa., has taken 2000 tons of No. 2 plain, and other soil pipe manufacturers have taken some round lots recently. A local stove manufacturer has taken 2000 tons also. Cold weather will stimulate this trade. Gray forge has sold at $15.85, delivered. A maker of Virginia iron has withdrawn quotations for delivery this year, and advanced his first quarter quotation on No. 2 X to $14, furnace, or $16.75, delivered. For delivery this year he probably would accept $13.50, furnace, or $16.25, delivered. His sales the past week aggregated 2500 tons, and in recent weeks he has reduced his furnace stocks notably. Basic has been quiet except for a sale of 6000 tons of Western iron to an eastern Pennsylvania steel mill at a little less than $17.50, delivered. It is unofficially reported that this price included a freight rate of $3.44, and it is believed that the furnace price was $14. This is the second lot of Western basic to be sold in this district this month. Sales of standard low phosphorus aggregating over 6000 tons have been made for delivery this year and early in 1916, the forward delivery demanding a premium. Sales for early shipment next year have been made at $25.50, delivered, and higher. Quotations for standard brands, delivered in buyers' yards, shipment this year, range about as follows:

Eastern Penna., No. 2 X foundry	$16.25 to $16.75
Eastern Penna., No. 2 plain	16.00 to 16.50
Virginia, No. 2 X foundry	16.00 to 16.75
Virginia, No. 2 plain	15.75 to 16.00
Gray forge	15.25 to 15.50
Basic	17.25 to 17.50
Standard low phosphorus	24.50 to 25.50

Iron Ore.—The Custom House reports the arrival last week of 13,550 tons of Cuban ore at this port. In general, the ore situation is unchanged.

Ferroalloys.—The quotation for 80 per cent ferromanganese is unchanged at $100, seaboard, on future deliveries, which are of course subject to restrictions. Carloads of spot readily bring $110 to $115. Last week 400 tons arrived here from England. The quotations for 50 per cent ferrosilicon are unchanged at $73 to $75, Pittsburgh, according to quantities. Although there have been no arrivals as yet of Indian manganese ore, one cargo is afloat and ships have been chartered for two others.

Bars.—The inquiry for large rounds continues at a heavy rate. Specifications for ordinary steel bars are good and prices are strong, ranging from 1.509c. to 1.559c., Philadelphia, on last quarter shipments and up to 1.609c. on those to be made within ten days. Iron bars are in good demand at 1.35c., Pittsburgh base, or 1.509c., Philadelphia.

Plates.—The market continues brisk and there is considerably more effort on the part of consumers to make contracts. A leading seller is quoting 1.559c., Philadelphia, on current requirements and 1.609c. for fourth quarter contracts, and is still reluctant to go into next year. Other sellers quote 1.509c. on prompt business and a few contracts have been made at 1.559c. Bids are now in on about 11,000 tons required at various United States navy yards.

Structural Material.—Business continues good and the mills have easily enough in sight for the remainder of the year. It is questionable if shapes can be obtained at 1.509c., Philadelphia. The usual minimum is 1.559c. on good-sized contracts, while 1.659c. is quoted on miscellaneous orders and 1.759c. on small orders for material out of stock cut to size. The Bethlehem Steel Company has placed an order with the McClintic-Marshall Company for 6000 tons required for a new building. The city of Philadelphia will take bids before Oct. 1 on 25,000 tons for the Frankford elevated line. The Carpenter Steel Company has placed 150 tons with the Eastern Steel Company. The Philadelphia & Reading Railroad will take bids Sept. 27 for a bridge over Emerald Street, this city, requiring about 600 tons. The Pennsylvania Railroad continues its buying of small bridges. New bids are to be taken on the so-called State armory, this city, which will require between 500 to 600 tons of steel. The Philadelphia & Reading is to replace a bridge over the Susquehanna River at Sunbury, Pa., for which about 4000 tons will be required. Another good-sized proposition is that of the Consolidated Gas & Electric Building, Baltimore, Md., about 3000 tons. Ballinger & Perrot are taking bids on the general contract for a building for the City Club of Philadelphia, in which about 250 tons of shapes will be used. Bids are being taken for a State hospital requiring at least 300 tons at Farview, near Carbondale, Pa. Bids are also being taken on a general contract for three local municipal bridges requiring in all about 500 tons. It is reported that quiet negotiations are under way for the erection here of a building which will require 8000 tons of structural material.

Sheets.—Miscellaneous demand continues good and the minimum quoted for No. 10 blue annealed is 1.809c., Philadelphia.

Billets.—A local maker of billets, who is also a consumer, states that he is practically out of the market. Inquiries continue plentiful, both for domestic and foreign delivery. Rerolling billets are quoted at $30 to $32 and forging billets at $38 to $40, and the irregularity is such that it is difficult to fix a definite price.

Coke.—Spot furnace coke is quoted at $1.60 to $1.75 per net ton at oven, but the interest lies altogether in contracts for next year. Sales have been made at $2 per net ton at oven on last quarter contracts, but the indications are that the price into next year will settle at about $2.25. Sellers have asked $2.50 in some cases, while buyers have intimated that they would pay $2.25. Foundry coke is unchanged at $2.30 to $2.60, per net ton at oven, for both prompt and future. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The easier tendency in heavy melting steel was halted the past week by the purchase of a round lot at $15 by an Eastern plate manufacturer. Old steel axles have sold for export in attractive lots at higher than domestic prices. The market on the whole is firm, despite the fact that the mills have paused to digest their recent purchases. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00 to $15.25
Old steel rails, rerolling	15.50 to 16.00
Low phos. heavy melting steel scrap	20.50 to 20.75
Old steel axles	19.50 to 20.50
Old iron axles (nominal)	22.00 to 23.00
Old iron rails	18.50 to 19.00
Old carwheels	14.00 to 14.50
No. 1 railroad wrought	16.50 to 17.00
Wrought-iron pipe	14.00 to 14.50
No. 1 forge fire	11.00 to 11.50
Bundled sheets	11.00 to 11.50
No. 2 busheling	9.50 to 10.00
Machine shop turnings	10.25 to 10.75
Cast borings	10.25 to 10.75
No. 1 cast	14.00 to 14.50
Grate bars, railroad	10.50 to 11.00
Stove plate	10.50 to 11.00
Railroad malleable	10.50 to 11.00

Buffalo

BUFFALO, N. Y., Sept. 21, 1915.

Pig Iron.—Users are more insistent on early deliveries of iron on existing contracts, and some are asking for additional quantities at the advanced prices. Stove manufacturers are becoming busier in some instances, after experiencing a prolonged dull period. More activity is being shown in basic; one producing interest has sold 3000 tons at $16, furnace, for delivery commencing at once and to be completed before the end of the year. Asking prices for basic are now $16 to $16.50 at furnace. For foundry grades and malleable, the range is $15 to $16.50 furnace for current and first quarter business. None of the furnaces of the district is actively soliciting 1916 business. The average price schedule to which producers are holding, as nearly as can be reported, is as follows, f.o.b. furnace, Buffalo, for fourth quarter and first quarter deliveries:

Foundry of 4 to 5 per cent silicon	$16.50
No. 1 foundry	16.00
No. 2 X foundry	$15.50 to 15.75
No. 2 plain	15.00
No. 3 foundry	15.00
Gray forge	15.00
Malleable	15.50 to 15.75
Basic	16.00 to 16.50
Charcoal—regular brands and analysis	16.75 to 17.75
Charcoal—special brand and analysis	20.00 to 21.00

Finished Iron and Steel.—Demand from buyers is in excess of sellers' ability to furnish. Great pressure is being brought to bear on local agencies to make prices on bars, plates and shapes for specification through first quarter of next year, but so far as is known mills are not quoting for that delivery at the present time. Inquiries are also appearing, asking quotations on tin plate and sheet products, but mills are not quoting. There is every evidence that prices are stiffening rapidly, and it is expected that all sellers will soon be asking 1.40c., Pittsburgh, for such material as is now available to the end of the year. Plates are stronger, and Eastern mills are asking a premium, due to the heavy shipbuilding and the export demand. For shapes 1.35c., Pittsburgh, is minimum, and several selling interests have advanced the price to 1.40c. for what can be supplied over the remainder of the year. Cold finished steel has been advanced to 62 off, f.o.b. Pittsburgh, carload lots, for prompt specification. The demand for wire products, especially for export, is far in excess of capacity of mills to supply. An inquiry is reported by one interest calling for 60,000 tons of barbed wire, to be painted green, to be shipped at the rate of 10,000 tons per month. Another interest reports inquiry for 6000 tons of No. 1 wire rods for export over first part of next year. The advance of $2 per ton on wire products is in effect in this market, making wire nails $1.75 per keg and No. 9 gage wire and coarser $1.60 base. One producing interest reports an advance of $2 per ton on iron bars, commencing Sept. 15, and that quantity differentials have been established on iron bars the same as now existing on

steel bars for lots of one ton and under. An extra rate of $1 per ton has been put into effect on lots of 5 tons or over and an extra rate of $2 on lots of less than 5 tons down to one ton, effective from Sept. 15. Large tonnages of corrugated bars have been sold from this market in the last week or two, one New York State item being approximately 350 tons of corrugated bars for the New Process Gear Company's factory addition, Syracuse, furnished by the Corrugated Bar Company, Buffalo. The latter company has also sold heavy tonnages of corrugated bars within the last week for shipment to points in the West and Middle West. Local fabricators report a continuance of well booked up conditions. Bids are in for 300 tons for carhouse for the Jamestown Traction Company, Jamestown, N. Y., and bids are being taken this week for 300 tons of steel for the Gebhard Lang Brewing Company, Buffalo. The Buffalo Structural Steel Company has 175 tons for the Casey Hotel, Scranton, Pa., and small amounts for the Defiance Paper Company, Niagara Falls, N. Y., and the Shredded Wheat Company, Niagara Falls, Ont.

Old Material.—Shipments on contracts continue heavy, but little new buying is reported except in old iron axles, old steel axles and low phosphorus steel. The rise in prices of these commodities has been pronounced, amounting to $2 per ton on iron axles and $1 per ton on each of the other two commodities. Other commodity prices remain the same as last week. The fact that dealers are accepting orders at the present prices and loading from stock is an indication that they are satisfied that the prices now current are probably as high as they are likely to go for some time to come. In fact a slight falling off is not regarded as unlikely after consumers now filling requirements are covered. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$13.00 to $13.50
Boiler plate, sheared	13.00 to 13.50
Low phosphorus steel	16.50 to 17.00
No. 1 railroad wrought scrap	12.50 to 13.00
No. 1 railroad and machinery cast	12.50 to 13.00
Old steel axles	17.00 to 17.50
Old iron axles	19.00 to 19.50
Old carwheels	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Machine shop turnings	9.00 to 9.50
Heavy axle turnings	9.00 to 9.50
Clean cast borings	7.50 to 7.75
Old iron rails	15.50 to 16.00
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	8.50 to 9.00
Wrought pipe	10.50 to 11.00
Bundled sheet scrap	9.50 to 10.00
No. 1 busheling scrap	10.00 to 10.50
No. 2 busheling scrap	8.50 to 9.00
Bundled tin scrap	10.00

Cleveland

CLEVELAND, OHIO, Sept. 21, 1915.

Iron Ore.—A few small sales have been made, and some additional business is pending. Shippers have about all the orders they can take care of for the remainder of the season, and it would be difficult to find vessels to move any additional round lots. While dealers feel that conditions warrant an advance in price for next season it is doubtful if the 1916 price will be established for some time. We quote prices as follows, delivered to lower Lake ports: Old range Bessemer, $3.85; Mesaba Bessemer, $3.45; Old Range non-Bessemer, $3; Mesaba non-Bessemer, $2.80.

Pig Iron.—The market has quieted down considerably, very few sales being reported in this territory. Little new inquiry is pending. Dealers do not look for much activity during the next few weeks, as consumers are well covered for the remainder of the year. A number of those who had not yet placed contracts for the first half are not expected to come in the market until later in the year. The $15 price for No. 2 foundry is being maintained in Cleveland and by some of the Valley interests, although foundry iron can still be had at $14.75, Valley furnace, for No. 2. Southern iron is dull. Producers are holding to $11.50, Birmingham, for No. 2 for the last quarter, but some resale iron can still be had at $11.25. One southern Ohio interest has advanced its price on silvery iron to $17.50 for 8 per cent for this year and $18 for the first half. There is no new inquiry for steelmaking iron in this territory. M. A. Hannan & Co. expect to blow in their Claire furnace at Sharpsville, Pa., shortly on Bessemer iron. Shipments are heavy, and the foundry melt appears to be increasing somewhat. We quote, delivered Cleveland, as follows:

Bessemer	$16.95
Basic	15.30
Northern No. 2 foundry	15.30
Southern No. 2 foundry	$15.25 to 15.50
Gray forge	14.75
Jackson Co. silvery 8 per cent silicon	18.12 to 18.62
Standard low phos. Valley furnace	23.50 to 24.00

Coke.—The market is inactive. There is no local inquiry for furnace coke, about all consumers being under contract. The surplus of spot coke has fallen off and prices are firm. There is very little new inquiry for foundry coke, but shipments are heavy. We quote standard Connellsville furnace coke at $1.70 to $1.75 for prompt shipment. Foundry coke is held at $2.25 to $2.50 for early shipment and $2.50 to $2.75 for contracts extending through the first half.

Finished Iron and Steel.—Specifications are heavy, and there is a fair volume of inquiries for steel for early delivery. Consumers find it harder every day to secure shipments desired on steel bars. One interest has advanced its price on bars, plates and shapes to 1.40c. for the last quarter delivery and is taking some business at the advance in price. Fairly prompt deliveries can be secured on plates which range in price from 1.30c. to 1.40c., Pittsburgh. In structural lines a fair amount of new work is pending. The King Bridge Company will be awarded the contract for 500 tons for the Union Avenue grade crossing elimination work in Cleveland, for which it was low bidder. The Massillon Bridge & Structural Company has taken 350 tons for the Stillman theater, Cleveland. The Hydraulic Pressed Steel Company has not yet placed 33,000 tons of steel bars for shells, for which an inquiry has been pending for about two weeks. Several other inquiries have come out for steel rounds for 3-in. to 6-in. shells in lots up to 25,000 tons, but as far as can be learned the contracts that have brought out these inquiries have not yet been placed. Bar iron has stiffened up to 1.50c., Cleveland, and quantity extras charged for steel bars are now being charged for iron bars. Some consumers are substituting iron bars because of the better deliveries they are able to secure. A local sale of forging billets is reported at $38. Wire products have advanced $2 a ton and shafting two points to 62 per cent off for carloads and 57 per cent off for less than carloads. Sheets are in fairly good demand at 1.90c. for No. 28 black and 1.50c. for No. 10 blue annealed. Some fourth quarter contracts have been closed at an advance of $2 a ton over these prices. Galvanized sheets are generally quoted at $3.75 for No. 28. Warehouse prices are 1.90c. for steel bars and 2c. for plates and structural material.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is heavy, the volume of orders being larger than during August. The market is firm and fourth-quarter contracts are being made at regular prices. Rivets are in good demand and are quoted at 1.60c. to 1.70c., Pittsburgh, for structural, and 1.70c. to 1.80c. for boiler rivets in carload lots. Bolt and nut discounts are as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 75, 10 and 10 per cent; cut thread, 75 and 10; larger or longer, 75 and 5; machine bolts with h. p. nuts ⅜ x 4 in., smaller or shorter, rolled thread, 75, 10, 10 and 5; cut thread, 75, 10 and 10 per cent; larger and longer, 75 and 10; coach and lag screws, 80 and 15; square h. p. nuts, blank or tapped, $5.80 off the list; hexagon h. p. blank or tapped, $6.30 off; c. p. c. and t. square nuts blank or tapped, $5.30 off; hexagon ⅝ in. and larger, $6.75 off; 9/16 in. and smaller, $7.25 off; cold pressed semi-finished hexagon nuts ⅝ in. and larger, 85 off; smaller, 85 and 10.

Old Material.—The demand is light and mills are not taking scrap as fast as desired. As a result prices are not so firm as they have been. While quotations generally are unchanged, dealers anxious to move scrap are selling small lots at some concession in price. Some heavy melting steel scrap has been sold in

Youngstown at $13.75 to $14. The embargo at Portsmouth has been lifted, but one of the Cleveland mills is accepting no shipments. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Old steel rails	$13.00 to $13.50
Old iron rails	14.00 to 14.50
Steel car axles	16.00 to 17.00
Heavy melting steel	12.50 to 12.75
Old carwheels	11.50 to 11.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	10.00 to 10.25
Railroad malleable	13.00 to 13.50
Steel axle turnings	10.00
Light bundled sheet scrap	10.00 to 10.50

Per Net Ton	
Iron car axles	$17.25 to $17.75
Cast borings	7.00 to 7.25
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
No. 1 cast	11.00 to 11.50
Railroad grate bars	9.00 to 9.50
Stove plate	8.75 to 9.00

Cincinnati

CINCINNATI, OHIO, Sept. 22, 1915.—(*By Wire.*)

Pig Iron.—A little more activity is reported in Northern foundry, basic and malleable, but sales of Southern foundry are somewhat limited, due to the inability of furnaces and consumers to agree on prices for next year's delivery. Northern No. 2 foundry, malleable and basic are all now held at $14.50, Ironton, for this year's shipment and at $15 for first half. Southern foundry has also advanced, and $11.50, Birmingham basis, appears to be the minimum for last quarter delivery, with $12.50 asked for first half. Ohio silvery irons have also registered an advance of 50c. per ton and are now quoted at $17.50 at furnace for this year's delivery and at $18 for first half. Sales reported include two lots to an Indiana melter of about 500 tons each of Northern foundry for first half. A Michigan firm also bought for the same delivery 500 tons of Ohio silvery. The Baltimore & Ohio and the Louisville & Nashville railroads have both bought on their requisitions, but some Southern iron is yet to be purchased by them. A considerable amount of basic from southern Ohio has been sold in Eastern territory, the amount being estimated at approximately 30,000 tons, most of which is to be shipped before April 1. General inquiries are scarce, and the amount of business under quiet negotiation, while showing some improvement, is not yet up to normal for the season. A Michigan manufacturer is expected to close this week for 600 tons of Lake Superior charcoal, and two limited lots of malleable will also be bought at an early date. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$14.90 to $15.40
Southern coke, No. 2 f'dry and 2 soft	14.40 to 14.90
Southern coke, No. 3 foundry	13.90 to 14.40
Southern No. 4 foundry	13.40 to 13.90
Southern gray forge	12.90 to 13.40
Ohio silvery, 8 per cent silicon	18.76 to 19.26
Southern Ohio coke, No. 1	16.76 to 17.01
Southern Ohio coke, No. 2	15.76 to 16.01
Southern Ohio coke, No. 3	15.51 to 15.76
Southern Ohio malleable Bessemer	15.76 to 16.01
Basic, Northern	15.76 to 16.01
Lake Superior charcoal	16.20 to 17.20
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—An inquiry is out from a southern Ohio furnace for approximately 20,000 tons of 48-hr. coke for first half. This contract is expected to be closed at an early date, although producers and consumers are having a hard time to agree on next year's prices. Prompt shipment Connellsville furnace coke is quoted at $1.65 to $1.75 per net ton at oven, and as high as $2 is asked for some coke to be shipped in the last quarter. Next year's prices are somewhat problematical. Several operators are quoting $2.20 per net ton at oven for first half. Prompt Connellsville 72-hr. coke is quoted around $2.35 to $2.60, the last named figure representing the average contract price. Wise County and Pocahontas producers are asking around $2 at oven for furnace coke for this year's delivery and from $2.20 to $2.25 for first half. Foundry coke in the last named districts ranges from $2.25 to $2.75. The foundries are not in need of much coke for nearby shipment, most of them having a supply ordered to run them through the next few months.

Finished Material.—The quotation on galvanized sheets has eased off a little and No. 28 is quoted now at 3.50c. to 3.75c., Pittsburgh basis, but black sheets are firm at 1.95c. to 2c. There is a better demand, but mostly for nearby shipment. The Cincinnati warehouse quotation on No. 28 galvanized is now 4.35c. and on No. 10 blue annealed sheets 2c. Steel bars remain at 1.90c. and small structural shapes around 2c. Local warehouses report a much better demand for nearly all classes of material and the recent advances in quotations have not served to cut off any business. Hoops and bands continue quiet.

Old Material.—With no change in the situation, prices remain as previously quoted. The principal demand at present is from the rolling mills, although the jobbing foundries making a specialty of machine tool castings are melting a large tonnage of scrap. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	$8.50 to $9.00
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	20.25 to 20.75
Rerolling steel rails	10.50 to 11.00
Heavy melting steel scrap	10.50 to 11.00
Steel rails for melting	10.50 to 11.00

Per Net Ton	
No. 1 railroad wrought	$9.50 to $10.00
Cast borings	6.25 to 6.75
Steel turnings	5.75 to 6.25
Railroad cast scrap	10.25 to 10.75
No. 1 machinery cast scrap	11.50 to 12.00
Burnt scrap	7.50 to 8.00
Old iron axles	15.00 to 15.50
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	7.25 to 7.75
Malleable and steel scrap	8.50 to 9.00
Railroad tank and sheet scrap	6.50 to 7.00

St. Louis

ST. LOUIS, MO., Sept. 20, 1915.

Pig Iron.—Stove foundries have been particularly strong purchasers in the past week. This strength in the market has been added to by the anxiety of a number of local industries not operating foundries to close for their requirements in castings for the first half of the coming year. The business booked in the week has ranged from 25 tons to 1000 tons in individual lots, with a total running close to 10,000 tons. A good proportion has been for early 1916 delivery and the quoted price for No. 2 Southern foundry, first quarter and first half ranges from $12.50 to $13 per ton, Birmingham basis.

Coke.—Only special brands or quick delivery small lots are being bought and they are commanding a premium over regular quotations, which remain unchanged. Local by-product coke continues to command the local market with prices made to meet the individual emergency.

Finished Iron and Steel.—Fabricators report an increasing amount of business in sight and many are getting behind with their work. There is thus more of a disposition to contract ahead, thereby eliminating the premium paid for material out of warehouse. On light rails the improvement noted last week continues, particularly with the coal mines. Track fastenings are in active request, particularly on specifications. On stock at warehouse we quote as follows: Soft steel bars, 1.80c.; iron bars, 1.75c.; tank plates, 1.90c.; structural material, 1.90c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gage, 4.40c. to 4.50c.

Old Material.—Scrap is firm and the prices quoted are well held by dealers, steel having been strengthened by quantities now moving to the local foundries, and to the East as well, where steel axles continue in demand for export. Foundry conditions are also good and considerable cast scrap is being sold. Rolling mills are becoming somewhat busier and are commencing to buy a little. Relaying rails continue rather hard to get.

In a general way business seems to be on a more satisfactory basis with much less disposition to speculate. We quote dealers' prices f.o.b. customer's works, St. Louis industrial district:

	Per Gross Ton	
Old iron rails	$11.00 to	$11.50
Old steel rails, rerolling	12.75 to	13.25
Old steel rails, less than 3 ft.	12.50 to	13.00
Relaying rails, standard section, subject to inspection	21.00 to	23.00
Old carwheels	10.50 to	11.00
No. 1 railroad heavy melting steel scrap	12.00 to	12.50
Shoveling steel	9.50 to	10.00
Frogs, switches and guards cut apart	11.50 to	12.00
Bundled sheet scrap	7.50 to	8.00
	Per Net Ton	
Iron angle bars	$11.75 to	$12.00
Steel angle bars	10.00 to	10.50
Iron car axles	15.75 to	16.25
Steel car axles	14.75 to	15.25
Wrought arch bars and transoms	13.75 to	14.25
No. 1 railroad wrought	10.50 to	10.75
No. 2 railroad wrought	9.75 to	10.25
Railroad springs	11.25 to	11.75
Steel couplers and knuckles	11.00 to	11.50
Locomotive tires, 42 in. and over, smooth inside	12.00 to	12.25
No. 1 dealers' forge	9.25 to	9.50
Mixed borings	6.00 to	6.50
No. 1 busheling	9.00 to	9.50
No. 1 boilers, cut to sheets and rings	7.50 to	8.00
No. 1 railroad cast scrap	10.50 to	10.75
Stove plate and light cast scrap	8.50 to	8.75
Railroad malleable	8.75 to	9.00
Agricultural malleable	7.75 to	8.00
Pipes and flues	7.25 to	7.75
Railroad sheet and tank scrap	7.00 to	7.25
Railroad grate bars	7.00 to	7.50
Machine shop turnings	7.00 to	7.50

Birmingham

BIRMINGHAM, ALA., Sept. 20, 1915.

Pig Iron.—Sales on a basis of $11.50 for spot and remainder of the year and $12.50 for 1916 are those usually met with. The Tennessee Company has advanced its price for first half of 1916 to $13.50. The volume of business the past week has not been great, but, as far as can be ascertained, prices are firm. One or two sales of strictly fourth quarter were made on the basis of $12. The real strength of the market seems to exist in the exceedingly well-filled order books of all the concerns, one of the largest of which has practically no iron in its yards. While the output has been increased again by two stacks, the companies putting these in operation are those with the heaviest order books. In spite of the additional output, one of these companies still remains out of the market except for taking care of customers. The large foundries of the South are increasing their takings. Two sales were made into strictly Eastern territory involving 3000 tons for first quarter of 1916 at $12.50. Some consuming interests have purchased above their wants for this year at spot prices to protect themselves against a further rise in price. These takings have served to create a quiet condition in the buying movement, but the lull has not affected the generally stiff attitude of Southern makers. Several thousand tons of pig iron have recently been shipped to Italian ports. The steel situation is unchanged, with all plants either at capacity or on double turn in some departments. Shrapnel shapes are being manufactured regularly at Ensley. An effort to place an order for 5000 tons of wire is said to have failed owing to the state of order books at Alabama plants. We quote, per gross ton, f.o.b., Birmingham district furnaces, for remainder of the year and 1916 delivery as follows:

No. 1 foundry and soft	$12.00 to $13.00
No. 2 foundry and soft	11.50 to 12.50
No. 3 foundry	11.00 to 12.00
No. 4 foundry	10.75 to 11.75
Gray forge	10.50 to 11.50
Basic	11.50 to 12.50
Charcoal	21.50 to 22.00

Cast-Iron Pipe.—The demand for water and gas pipe continues satisfactory, with the enlarged plant of the leading interest at Bessemer a taker of several orders for the Middle West. The output is increasing, but is well taken care of at the advance of several weeks ago. Sanitary pipe shops are not on full turn. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $21.50; 6-in. and upward, $19.50, with $1 added for gas pipe.

Coal and Coke.—Coke remains strong at the prices in vogue for some time, the increased amount of both by-product and beehive preventing a scarcity that at one time seemed imminent. However, the entire output is easily taken care of. We quote, per net ton, f.o.b. oven, as follows: Beehive furnace, $2.75 to $3; beehive foundry, $3 to $3.25; by-product, $2.50 to $2.75. Coal is not recovering as fast as was hoped. The larger steam mines are on full turn, but prices have not risen from low levels. Warrior River operations are proving quite successful.

Old Material.—Dealers report a slight let-up in the current demand for heavy steel scrap, but a continuance of inquiry for all light grades. Recent activity emptied the yards of stock and dealers are looking about for replenishment. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.50 to $14.00
Old steel axles	13.00 to 13.50
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	9.50 to 10.00
Tram carwheels	9.50 to 10.00
Stove plate	8.00 to 8.50

New York

NEW YORK, Sept. 22, 1915.

Pig Iron.—There is no great amount of buying by foundries. The International Steam Pump Company, which closed early in the month for a part of its inquiries covering 8000 to 11,000 tons for its various plants, has been in the market in the past week for 2000 tons for Harrison, N. J., and it is believed this iron has been bought. A northern New York State inquiry for the early months of 1916 is for 2500 tons. In Connecticut 500 tons is under consideration by one buyer. Sales have generally ranged from 100 and 200 tons to 500 tons. A New Jersey railroad supply foundry has taken 500 tons of 1 to 1.25 per cent silicon iron with a sulphur limit of 0.05. The price was around $16 delivered, with a freight from eastern Pennsylvania that would represent $14.50 to $14.75 at furnace. For Virginia irons the new higher prices are now asked by all sellers, $13.50 being quoted for No. 2 X for this year and $14 for 1916, delivered. Export sales keep up and there is good demand both at home and from abroad for low-phosphorus iron. Northern New York low-phosphorus iron has sold at $23 at furnace. We quote at tidewater as follows for fourth quarter delivery: No. 1 foundry, $16.50 to $16.75; No. 2 X, $16.25 to $16.50; No. 2 plain, $15.75 to $16; Southern iron, $16.50 to $17 for No. 1 and $16.25 to $16.50 for No. 2.

Ferroalloys.—The British restrictions on the exports of ferromanganese, with a view to conserving supplies there, as announced in this report on July 29, are evidently being drastically carried out. The effects are now becoming more evident here. Of the five representatives in this country of the six British producers of ferromanganese, it is understood that three are receiving some shipments, the other two being out of the market for the present, their principals having none to offer for export. Receipts here for September are not to be up to expectations, only 400 tons having been received at one principal Eastern port this month. There is no information as to October or later. The quotation is nominal at $100, seaboard, with some sales of small lots reported subject to the usual restrictions. Independent domestic producers of the alloy are not active, though some sales are noted up to $110 and higher, with others as low as $100, seaboard. One western Pennsylvania producer is reported sold up on ferromanganese for the present. Spiegeleisen is not active, though some sales are reported at $30, at furnace, for the 19 to 21 per cent grade. The leading producer is out of the market for the rest of the year for both the higher and lower grades, the quotation being nominal at $28, at furnace, for the higher quality, with the lower in proportion. Ferrosilicon, 50 per cent, is active and strong, with domestic demand exceeding the supply.

Structural Material.—That the strong position of the structural rolling mills is not due to general building demand is indicated by the low fabrication prices still obtaining; nor is it because of active buying of railroad cars, the prices of which in late light buying have been low in view of the higher prices of the steel. It seems clear that more structural shapes have been sold on account of the war than has been appreciated. The relatively low consumption for car building has of course been augmented by the cars being built for Russia, and factory expansion for making war munitions has quietly taken quantities which may have been underestimated. General foreign shipment has not figured large, and while municipal buildings and municipal railroads have been conspicuously large factors, the continued activity of the mills rolling shapes has not been without surprise to those in the trade. And this, with a recognition of a diverting, in some mills, of the short supply of steel to other products, semi-finished as well as finished. With no betterment in deliveries, commonly six and more weeks, prices are ruling strong at 1.40c., Pittsburgh., and while 1.35c. is quoted by the largest mills, deliveries are not usually so good as by mills demanding the higher price. The largest fabrication job closed is for 2000 tons for the Finck printing building, West Thirty-ninth street, placed with Post & McCord. Another piershed is up for figures, 700 tons, West Twenty-third Street, while Snare & Triest, Inc., has been awarded the 1000-ton piershed, Thirtieth Street, Brooklyn. John Eichley & Co., Pittsburgh, have the 400-ton contract for the Seneca Falls Mfg. Co., Seneca Falls, N. Y. We quote mill shipments at 1.35c. to 1.40c., Pittsburgh, or 1.519c. to 1.569c., New York. For small lots from store we quote 2.05c. to 2.10c., New York.

Steel Plates.—Boiler makers report better business of late, with some orders for foreign account. Here and there buyers are sounding for fourth quarter, with an admission that they expect to pay $2 per ton above the present contract basis, but no definite closures came to light. While 1.40c., Pittsburgh, is easily obtained on current business, 1.35c. has not disappeared. Business growing out of railroad car building is still negligible, with no immediate prospects of the now long waited activity. We quote mill shipments of plates at 1.35c. to 1.40c., Pittsburgh, or 1.519c. to 1.569c., New York. Plates from store are 2.05c. to 2.10c., New York.

Iron and Steel Bars.—There is no cessation of inquiry for bars and blooms for the belligerents. While little is now obtainable from the mills for this year's delivery, booking for 1916 is generally held in abeyance. There is plenty of competition, but with the exactions of discard and other stipulations of the specifications, not to mention arrangements for payment, prices are high in comparison with ordinary open-hearth bars for domestic use. Quotations range from 2.50c. to 3.5c. per pound, with the majority at about 2¾c., particularly when there is some latitude as regards lengths. Some of the mills are paying less consideration to the possible needs of domestic buyers than some weeks ago, for with an apathetic attitude in the case of such buyers in the face of attractive war business advantage is taken of the opportunity to accommodate the tonnage buying for war munitions. It seems more likely therefore that premium sales will be the order very often in urgent cases of home needs. The minimum price of 1.35c., Pittsburgh, bids fair, if it continues, to be a nominal quotation. We quote mill shipments of steel bars at 1.35c. to 1.40c., Pittsburgh, or 1.519c. to 1.569c., New York, and refined iron bars, 1.519c., New York. Out of store in New York iron and steel bars are 2c. to 2.05c.

Cast-Iron Pipe.—The Panama Canal, Washington, D. C., will open bids Sept. 24 for 350 tons of pipe for Colon. No other public lettings of importance are in sight. Jersey City, N. J., is expected to be in the market shortly for a large quantity of 48-in. flexible joint pipe to be laid across the Hackensack meadows. Private inquiry is of good volume, and pipe foundries are steadily booking business of this character, although individual orders are not large. Inquiries on export account continue to come forward but apparently do not develop into actual business. Carload lots of 6-in., class B and heavier, are quoted at $24.50 to $25 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton. These quotations were erroneously given in last week's issue of THE IRON AGE as per gross ton.

Old Material.—A few lots of heavy melting steel scrap were sold to steel companies in eastern Pennsylvania the past week, but the demand for this class of material was not brisk. Rolling-mill stock was quiet, with the exception of old steel axles, which were in some demand for export. Wrought pipe and borings and turnings display some weakness. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

Old girder and T rails for melting	$12.25 to $12.50
Heavy melting steel scrap	12.25 to 12.50
Relaying rails	19.50 to 20.00
Rerolling rails	13.00 to 13.50
Iron car axles	22.00 to 22.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
Wrought iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.75 to 13.00
No. 1 yard wrought, short	12.25 to 12.50
Light iron (nominal)	4.00 to 4.25
Cast borings	8.00 to 8.25
Wrought turnings	8.00 to 8.25
Wrought pipe	11.75 to 12.00

Cast scrap is quiet, purchases being confined to small lots. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

Old carwheels	$12.00 to $12.25
No. 1 cast (machinery)	12.75 to 13.00
No. 2 cast (heavy)	11.75 to 12.00
Stove plate	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
Malleable cast (railroad)	10.00 to 10.50

British Market Firm

Ferromanganese to be Made in India—American Sales of Rails and Tin Plate

(*By Cable*)

LONDON, ENGLAND, Sept. 22, 1915.

The tone of the warrant pig-iron market is easy with speculation dormant, although there is a little more doing in makers' iron and producers are unwilling to accept lower prices. A slightly better feeling in hematite iron is apparent with more inquiry from the home trade and the Continent. Fair quantities of East Coast mixed numbers have been sold at 96s. 6d. on track, while Italy has purchased a respectable tonnage. Furnaces in blast are 163, against 158 at the same time a year ago. Stocks of pig iron in Connal's stores are 141,659 tons at the close of last week, as compared with 141,187 tons the week previous.

The Tata Iron & Steel Company of India is starting the production of ferromanganese. One independent American maker of tin plates is reported to have sold 200,000 boxes, mainly for Scandinavia. Rails are very quiet, American competition depressing prices. Finished merchant steel is firm, but works are concentrating more and more upon munitions and on huge orders placed for shell steel. Welsh semi-finished steels are easier, owing to the depression in tin-plate and in galvanized sheet works. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 17s. 3d., compared with 17s. 10½d. a week ago.

Cleveland pig-iron warrants, 64c. 2d., against 64s. 10½d. last week.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 64s. 3d., against 65s. one week ago.

Steel black sheets, No. 28, export f.o.b. Liverpool, £11 15s.

Steel ship plates, Scotch, delivered local yards, £10 against £10 5s. a week ago.

Steel rails, export, f.o.b. works port, £8 17s. 6d.

Hematite pig iron, f.o.b. Tees, 95s. 6d.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 5s.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £11 compared with £10 10s. last week.

Steel bars, export, f.o.b. Clyde, £12 5s., against £12 one week ago.

Ferromanganese, f.o.b., £20 15s.

Ferrosilicon, 50 per cent, c.i.f. £19 10s.

Metal Market

NEW YORK, Sept. 22, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Sept.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
15	18.00	17.75	33.12½	4.50	4.32½	13.75	13.50
16	18.00	17.75	33.25	4.50	4.32½	13.75	13.50
17	18.00	17.75	33.25	4.50	4.32½	13.75	13.50
18	18.00	17.75	.....	4.50	4.32½	13.50	13.25
20	17.87½	17.75	33.00	4.50	4.32½	13.50	13.25
21	17.87½	17.75	33.00	4.50	4.32½	13.25	13.00

New York

Copper is dull, with electrolytic firmer than Lake. Tin is neglected and lower, Lead is quiet but steady. Spelter is weaker and buyers are few. Antimony is dull, and the nominal quotations are unchanged.

Copper.—Late last week there was a little business in Lake at 18c., cash, New York, but in spite of optimistic talk the Lake market to-day is a little softer. In electrolytic there has been practically no business, but its price is contradictory as compared with Lake for the reason that its quotations are firm. There has been much talk of export sales, but they cannot be traced to any definite source and it is considered certain that no export sales of importance have been made. The fact is that the entire metal market is awaiting the outcome of the foreign loan negotiations, and some of the trade think that too much dependence is being placed in this direction. Electrolytic copper is quoted at 17.75c., cash, New York, and prime Lake at 17.87½c., while less desirable grades of Lake have been quoted down to 17c., cash, New York. In the absence of business some of the electrolytic producers have continued to call their price 18c., full terms. The exports this month have been only 6609 tons.

Tin.—The market is practically at a standstill, with no interest being shown in either spot or future deliveries. The quotation yesterday was 33c. There is a feeling that if the price should drop to 32.50c., business might result from some tentative inquiry now being made, but sellers fear that if it drops to 32.50c. it would not stop there, but continue to decline. The arrivals are large, amounting to 4623 tons this month, a good part of which is not sold, and all the indications point to an increase in stock Oct. 1. The market is suffering from an oversupply, for one thing, and it is also adversely affected by the foreign exchange situation. It is believed that matters will be helped a great deal when the price of the pound sterling rises to a more normal basis and this depends to a considerable extent on the succesful culmination of the contemplated foreign loan. The quantity afloat is 2710 tons.

Lead.—This metal has been dull and uninteresting, though the quotation has been maintained at 4.50c., New York, by both the leading interest and independent sellers. The latter have shown little or no tendency to go under that price since it was established Sept. 14. The St. Louis quotation is off 2½ points and is now 4.32½c. It is generally believed that the New York quotation will hold steady for some time. The exports this month total 1507 tons. A little inquiry from Japan is reported.

Antimony.—No interest whatever is shown, and the nominal quotations are unchanged at 27.50c. to 28.50c., duty paid, for Chinese.

Old Metals.—Dullness continues. Dealers' selling quotations, which are nominal only, are as follows:

	Cents per lb.
Copper, heavy and crucible	16.50 to 16.75
Copper, heavy and wire	16.00 to 16.25
Copper, light and bottoms	14.00 to 14.25
Brass, heavy	11.50 to 11.75
Brass, light	10.00 to 10.25
Heavy machine composition	13.00 to 13.50
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	11.50 to 12.00
Lead, heavy	4.25
Lead, tea	4.00
Zinc scrap	11.00 to 12.00

Spelter.—The market is weak at 13.25c., New York, for prime Western, and 13c., St. Louis. Consumers evidently anticipate lower prices and are reluctant to make contracts, and as a result of this attitude most of the business has been confined to prompt deliveries. Quotations for delivery to the end of the year range down to 12.25c. Brass mill special is quoted at 16c. and grades which can be substituted for very choice brands are sold at 27c. The London market has declined almost daily in the past week.

Chicago

SEPT. 20.—Advances in the price of copper are coincident with the assumption of a firmer attitude by producers. Lead quotations, in contrast, are lower, and tin prices are off, following heavy receipts. The week opens with another reversal in spelter, and higher quotations are again in effect. We quote: Casting copper, 17.50c.; Lake copper, 18c.; tin, carloads, 33.50c.; small lots, 36c.; lead, 4.40c. to 4.45c.; spelter, nominally, 14c.; sheet zinc, nominally, 16c.; Cookson's antimony, 47.50c. to 50c.; other grades, 32c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c; copper bottoms, 12.50c.; copper clips, 13.50c.; red brass, 11.25c.; yellow brass, 10c.; lead pipe, 3.75c.; zinc, 9c.; pewter, No. 1, 18c.; tinfoil, 25c.; block tin pipe, 28c.

St. Louis

SEPT. 20.—The weaker tone in non-ferrous metals has continued and lead is quotable to-day at 4.30c. to 4.35c., with some inquiry, but no business. Spelter is also lower and nominal at 12c. to 13c. Tin is quiet at 33½c. to 34c.; Lake copper, 18c.; electrolytic copper, 17½c.; Asiatic antimony, 31c. to 32c. In the Joplin ore market zinc blende has been lower, with a basis range of $65 to $78 per ton for 60 per cent and the top settlement at $81. Calamine has been rather firm at $50 to $65 for 40 per cent, with premium ores reaching $75. Lead ore has been lower at $48 to $50 for 80 per cent. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8.50c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 12c.; pewter, 20c.; tinfoil, 28c.; zinc, 6.50c.; lead, 3.50c.; tea lead, 3.50c.

Iron and Industrial Stocks

NEW YORK, Sept. 22, 1915.

General conditions continuing favorable, and the success of the Anglo-French loan being practically assured, the stock market has manifested great strength the past week. In some of the industrial stocks decided spurts were made, notably with respect to some of the automobile companies, Colorado Fuel, Great Northern Ore, American Steel Foundries, Cambria Steel and Chicago Pneumatic Tool. The rise in Colorado Fuel and Great Northern Ore was accompanied by rumors of a merger of the two interests, but this was promptly denied by James J. Hill. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	41⅞ - 45⅛	Pitts. Stl., pref.	90 - 91
Allis-Chal., pref.	70 - 72⅞	Pressed Stl., com.	60¼ - 64
Am. Can, com.	59⅜ - 62	Ry. Stl. Spg., com.	37⅝ - 40⅞
Am. Can, pref.	104½ - 106½	Ry. Stl. Spg., pref.	92
Am. Car & Fdy., com.	68⅝ - 74⅝	Republic, com.	42⅜ - 46½
Am. Car & Fdy., pref.	116⅜	Republic, pref.	99⅞ - 100⅞
Am. Loco., com.	54 - 58½	Rumely Co., com.	3⅝ - 6⅜
Am. Loco., pref.	97 - 100	Rumely Co., pref.	7 - 10
Am. Stl. Fdries.	52 - 58	Sloss, com.	51 - 55¾
Bald. Loco., com.	79 - 82⅞	Pipe, com.	21½ - 22⅝
Bald. Loco., pref.	106 - 107½	U. S. Steel, com.	74¼ - 76⅜
Beth. Steel, com.	335½ - 357	U. S. Steel, pref.	113 - 114
Beth. Steel, pref.	151¼ - 169	Va. I. C. & Coke	58⅜ - 63½
Colorado Fuel	45¾ - 58⅜	West'gh'se Elec.	115¼ - 123½
Deere & Co., pref.	99	Am. Ship, com.	36 - 38½
Gen. Electric	170½ - 174¾	Chic. Pneu. Tool	78 - 90
Gt. No. Ore Cert.	405⅜ - 481⅛	Cambria Steel	61½ - 65
Int. Harv. of N. J., com.	106½ - 108	Lake Sup. Corp.	5⅜ - 10⅞
Int. Harv. of N. J., pref.	117 - 117⅛	Pa. Steel, com.	40½
Lackawanna Stl.	67¾ - 70¼	Pa. Steel, pref.	83¼ - 84
Nat. En. & Stm., com.	26 - 27½	Warwick	10¾
Nat. En. & Stm., pref.	89	Cruc. Steel, com.	91⅜ - 97½
		Cruc. Steel, pref.	105⅝ - 107½
		La Belle Iron, com.	39¾ - 41½

Dividends

The Boston Belting Company, regular quarterly, $2 a share, payable Oct. 1.

The Sloss-Sheffield Steel & Iron Company, quar-

terly, 1¾ per cent, payable in scrip due Oct. 1, 1916, bearing 6 per cent interest from Oct. 1, 1915. No dividends were declared in April and July, while the January dividend was also made payable in scrip.

The American Laundry Machine Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 15.

The American Typefounders Company, regular quarterly, 1 per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 15.

The Colt's Patent Firearms Mfg. Company, regular quarterly, 2½ per cent and an extra 2 per cent, payable Oct. 2.

The General Motors Company, 50 per cent on the common stock, payable Oct. 15, and 3½ per cent on the preferred stock, payable Nov. 1.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent, payable Sept. 30.

The Washburn Wire Company, regular quarterly, 2 per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 1.

The Willys-Overland Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

Directors of the Crucible Steel Company of America met in Pittsburgh Sept. 16, but no action was taken in regard to dividends on either the preferred or common stock. No dividends have so far been paid on the common stock, and dividends on the preferred were passed some months ago. A director of the company is reported as stating that dividends on the preferred stock would be resumed in January, but this is not confirmed.

The Brier Hill Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The Dodge Mfg. Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The Chicago Railway Equipment Company, regular quarterly, 1¾ per cent, payable Oct. 1.

The Canadian Westinghouse Company, Ltd., regular quarterly, 1 per cent, payable Oct. 1.

The E. W. Bliss Company, regular quarterly, 2 per cent on the preferred and 1¼ per cent on the common stock, and an extra of 1¼ per cent on the common stock, payable Oct. 1.

The Yale & Towne Mfg. Company, regular quarterly, 1¾ per cent, payable Oct. 1.

The American Brake Shoe & Foundry Company, regular quarterly, 2 per cent on the preferred and 1¾ per cent on the common stock, payable Sept. 30.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent, payable Oct. 1.

A New Chinese Blast Furnace

The establishment of blast furnaces at Penhsihu, Manchuria, China, by a Japanese company, the Penhsihu Colliery & Mining Company, may be the beginning of a great industry, according to the report of Consul General P. S. Heintzleman of Mukden, Manchuria. The hills northeast of that center are known to contain large deposits of iron ore, while coal and lime are abundant and water power easily developed. The producing capacity of the furnaces is planned to be 150 tons per day. One furnace was put in blast in November, 1914. About 35,000 tons a year will go to the South Manchuria Railway workshops and to the Kawasaki dockyard, Kobe, Japan. In April imported pig iron was quoted in Japan at $20 to $22.50 per ton. The company is prepared to offer its product at $17.50 to $20.

The average daily output of the Penhsihu Colliery & Mining Company's plant has been 120 tons of pig iron and at times as high as 147 tons. The production for 1915 is expected to exceed 36,000 tons. The character of the iron is indicated by a reported phosphorus and sulphur content of about 0.088 to 0.044 per cent. The Japanese navy is purchasing this iron and the Osaka Iron Works of Japan has placed an order for 15,000 tons while the army arsenal at Osaka has taken some.

Large Shelby Tube Extensions

The Shelby Steel Tube Company, Frick Building, Pittsburgh, a subsidiary of the United States Steel Corporation, with works at Ellwood City, Pa., some months ago appropriated $600,000 for extensions and betterments, and this amount has just been increased to $1,500,000, all of which will be spent in plant additions. An electrically driven continuous bar mill will be built for rolling open-hearth steel blooms into rounds. It will be equipped with continuous heating furnaces, hot saws and other machinery and will have a capacity of 175,000 tons annually. There will also be erected two electrically driven piercing mills with auxiliary rolling mills, equipped with heating furnaces and all other necessary appliances. These two mills will have an annual capacity of 60,000 tons of finished seamless steel tubes.

Additions to the power plant will consist of one 1500-kw. low pressure turbo-generator and one 2500-kw. high pressure turbo-generator, also one 1600-hp. flywheel balancer set. New buildings will consist of an extension to the present mill building, 80 x 448 ft.; a new bar-mill building, 60 x 348 ft.; shipping shed, 90 x 70 ft.; motor shed, 28 x 180 ft.; gas producer building, 20 x 96 ft., piercing and hot mill building, 240 x 640 ft. All these buildings will be of steel construction, requiring 1500 tons of structural steel, and a contract for their erection has been placed with the American Bridge Company. The company will not build open-hearth steel furnaces at Ellwood City, but will continue to get its supply of blooms from the Lorain Steel Company, Lorain, Ohio, and from the Homestead steel works of the Carnegie Steel Company. The present capacity of the Shelby Steel Tube Company is about 60,000 tons of finished seamless steel tubes, ranging from 2 to 8 in. in diameter, but when all these additions have been completed it will have an annual capacity of 120,000 tons of seamless steel tubes of these sizes. As yet no contracts have been placed, with the exception of that for the steel buildings, but contracts for the equipment will probably be given out at an early date, and the work will be put through as fast as possible. It is expected to have everything completed and in operation in six to nine months.

New Installations of Heroult Electric Furnaces

Four contracts for new installations of Heroult electric furnaces are announced by the United States Steel Corporation.

The Latrobe Electric Steel Company, Latrobe, Pa., will add a 3-ton furnace to its equipment. It is operating a 6-ton Heroult furnace for producing special and tool steels.

The Belle City Malleable Iron Company, Racine, Wis., is to install a 3-ton furnace in its steel castings department to make steel castings. It is now using the crucible process.

The Buchanan Electric Steel Company, Buchanan, Mich., will add a 2-ton furnace. It is now operating a 3-ton Heroult furnace and produces steel castings.

The Buckeye Steel Castings Company, Columbus, Ohio, has contracted for a 6-ton furnace. It has a large open-hearth department.

The Waltham Emery Wheel Company, Waltham, Mass., has changed its corporate name to Waltham Grinding Wheel Company, chiefly because electric-furnace abrasives have largely supplanted emery as the material of which Waltham grinding wheels are manufactured. The company was one of the early concerns in the abrasive wheel industry.

High-speed steel prices have again been advanced by the Vanadium Alloys Steel Company, Pittsburgh, which has placed Red Cut Cobalt, bar stock, at $1.40 per pound, base.

The Ashland Iron & Mining Company, Inc., Ashland, Ky., expects to blow in its No. 2 furnace Oct. 1. The No. 1 furnace was blown in Aug. 2.

The Government and Work on Munitions

Will the Small Plant Have a Place in Army and Navy Plans?—Important Questions Involved in the Canvass of Manufacturers

WASHINGTON, D. C., Sept. 21, 1915.—The canvass of the resources of the country for the manufacture of war material for both the army and navy, the details of which have heretofore been set forth in THE IRON AGE, is developing some deeply interesting problems. At no time have the officials of the Government doubted the ability of American manufacturers to supply needed material in adequate quantity or their willingness to turn from more profitable foreign business to take care of their own Government in emergency. The most important developments, however, are those which present grave administrative questions, which will no doubt engage the best minds of both the executive and legislative branches of the Government for a long time to come.

The overshadowing problem developed by this canvass is what policy shall the Government adopt to utilize to the utmost the facilities for producing war material which now exist and how shall these facilities be preserved for future use? This question cannot be answered by administrative officials, although theirs will be the duty of formulating a definite policy. Congress must be called upon not only to provide the Executive with broader powers and greater authority, but also to cut away ruthlessly the red tape which now binds the hands of the Government's experts and prevents them from utilizing to the best advantage even the meager resources now at their command.

The canvass of manufacturers has disclosed the fact that while, if this Government were in the market today for large quantities of war material, its needs would be promptly supplied, these supplies would come, of necessity, from a few very large concerns which are not new seeking new business and which would be called upon to make substantial sacrifices to sell to the Government. On the other hand, large numbers of relatively small manufacturers, with limited resources and in many cases lacking the special equipment to provide material which the Government might need, are anxious to obtain war orders either to supplement a reduced volume of regular business or to justify a desired expansion of producing capacity.

MANUFACTURERS WANT DETAIL DRAWINGS

In the circular letter to manufacturers, published in THE IRON AGE of Aug. 12, the War Department stated specifically that "it is to be understood that the department is not now in the market for this material and that no promise of an order is involved in this inquiry." Nevertheless, many manufacturers appear to believe that, if it desires to do so, the Government may either place orders for considerable quantities of material or may take immediate steps to assist producers in putting their plants into shape for the manufacture of specific classes of material to be ordered when Congress provides the necessary funds. While the general drawing showing shells and shrapnel which was sent out with the department's original letter of inquiry has served to give manufacturers an excellent general idea of the character of these particular items, details of finish and other items necessary to the accurate calculation of costs were lacking and a number of manufacturers have applied for detailed drawings and complete specifications, declaring their intention to make close estimates of cost of production and to take steps to equip their plants for the manufacture of this material.

CAREFUL OF NEUTRALITY

Parties making these requests have been disappointed to receive replies stating that the department, under the general instructions issued by the Secretary of War some months ago, cannot supply to manufacturers not actually engaged in the production of munitions for the American Government, or who have not received orders from this Government therefor, detailed drawings and specifications for war material of any kind. The secretary's instructions were based upon the view, which it is understood was shared by the President, that the information and facilities of the War Department ought not to be drawn upon by any manufacturing concern engaged or desiring to engage in the production of war material for the belligerent nations of Europe. This ruling, while based upon a perfectly sound principle of neutrality, is proving embarrassing in connection with the mobilization of the manufacturing resources of the country and is likely to put a stop to the plans of many small concerns to put themselves in readiness for Government work. It is, of course, possible that the further development of the program of preparedness may result in the modification of this ruling as applying to concerns which request information and which give assurances that the desired data are to be used solely in the interest of the United States and not as aids in the production of munitions for export.

GOVERNMENT DEPENDENCE ON PRIVATE PLANTS

The inquiry now on foot has demonstrated beyond question the great wisdom of General Crozier's policy with respect to the manufacture of war munitions by the Government, which has heretofore been described in THE IRON AGE. General Crozier believes that while the expansibility and potential manufacturing capacity of the Government arsenals should be greatly increased, their actual production should be limited to an amount sufficient to keep the equipment in a high state of efficiency and that the greater part of the Government's requirements should be obtained under contracts judiciously allotted to private manufacturers for the purpose of encouraging them to maintain their plants in a state of readiness to meet extraordinary demands if an emergency should arise.

It did not require the canvass now in progress to convince the War Department officials that the present capacity of munitions plants in this country is far in excess of any demands that may be made upon them by this Government, no matter how liberal the program of preparedness by Congress might be. The serious question is what will happen when the foreign war ends and business in all branches goes back to normal? It is a foregone conclusion that the instant peace is declared the placing of foreign contracts for war material in the United States will cease and it may be expected that efforts will be made to cancel all outstanding contracts which are not absolutely ironclad. In the shrinkage that will unquestionably follow, what policy should the Government pursue to keep in existence the greatest potential producing capacity? Will not the principle of the survival of the fittest prevail and will not a few big corporations find themselves in a position where, from their own standpoint, it will be desirable, if not necessary, that they should underbid all competitors to secure business and keep their enormous plants in operation? In such an event what chance will the small manufacturer have in bidding for Government contracts?

Here there arises also the question as to how far the Government should go in encouraging small manufacturers to equip themselves for the production of war material when it cannot be positively stated that orders will ever be given and when, if contracts are placed on a competitive basis, there is little prospect that any considerable volume of business can be distributed among relatively small producers. The responsibility of the Government in encouraging small manufacturers

to make additions to their equipment in the hope of obtaining munitions contracts would be very great and it is not surprising that the officials shrink from assuming it. Up to the present time they have given no assurances involving an obligation of any kind, but, of course, in pursuing this policy they are slowing down, if not entirely heading off, the movement designed to place at the command of the Government a productive capacity which in the aggregate would be worthy of serious consideration.

THE CHANCE OF THE SMALL PLANT

If the suggestion is made that the Government should allot contracts for war material, present and prospective, in such a way as to encourage the largest possible number of producers, the answer is that Congress, by requiring the department to buy from the lowest responsible bidder, has tied the hands of the officials. It is contended with much force that it would be far more to the interest of the Government that contracts should be let in the discretion of the Secretary of War than that they should always go to the lowest bidder. In the latter event two or three big concerns would secure all the orders. Certain experts contend that the experience of Germany has fully demonstrated the wisdom of building up a small number of very large plants for the manufacture of munitions, and in this behalf it is asserted that only in such plants is it practicable to maintain a large engineering department capable of devising new weapons and developing this important branch of the art of war.

A concrete illustration of the problem the officials are facing is embodied in a suggestion made in certain quarters that the Government should furnish to manufacturers complete sets of test tools, patterns, dies, etc., for the manufacture of certain types of small arms. Presumably those offering this suggestion have some idea of the cost of putting it into practice, but it may interest those who have given no consideration to the matter to learn that a single set of tools and appliances referred to would represent an outlay of nearly a quarter of a million dollars. On the one hand, large concerns which would undoubtedly make the most efficient use of these appliances would stand in the smallest need of Government assistance, while producers of limited resources who would be most anxious to procure both the installation and orders for material would be of least assistance to the Government after they received them.

NO GOVERNMENT ARMOR PLATE PLANT

There is reason to believe that the experience of the Navy Department in undertaking to mobilize resources for the production of war materials will have an important influence upon the secretary's policy with respect to a Government armor plant. It is, perhaps, too much to expect that the usual recommendation for such an establishment will be omitted from the secretary's forthcoming annual report, but it is improbable that the matter will be seriously followed up in Congress. The logical result of the establishment of a Government plant capable of producing all the armor needed by the navy would be to put the armor plate departments of three large steel manufacturing concerns practically out of business, for it is doubtful if their foreign orders would justify them in continuing this work. Yet at this very moment the Navy Department is making every effort to encourage domestic producers of all kinds of material needed for the upbuilding of the navy, and the secretary himself cannot fail to know, for he has been repeatedly informed of the fact, that the domestic armor manufacturers have always received a much higher price for the plate they have shipped abroad than they have charged this Government. Even Congress is likely to realize now that the closing down of the armor plate departments of three big steel producers, as the result of such an experiment as that proposed by the Secretary of the Navy, would be little less than a national calamity.

The sale of material to the American Government at much less than the domestic producers can secure from foreign governments is not confined to armor plate. One of the largest powder manufacturing concerns in the country has obtained much higher prices for its product abroad, even before the beginning of the present war, than it received from this Government. For some years the price paid by the War and Navy Departments was fixed by a board, in which the powder company had no representation, but whose edict it promptly and patriotically accepted. Subsequently Congress took the matter in hand, reduced the price to a ruinous figure and launched the Government in the business of making powder. By the elimination of overhead, interest on investment and other items which the private manufacturer is bound to consider, the Government was enabled, on paper at least, to show a cost of production less than was formerly paid, but the real cost on a fairly comparative basis has never been determined and, of course, the Government production would be negligible in a great emergency. The powder company, however, notwithstanding the fact that to-day it is obtaining for its products at least twice the price fixed by Congress, has given assurances of its willingness to supply both the army and navy without regard to the financial loss involved. W. L. C.

Pittsburgh Foundrymen's Association

The first of the fall and winter meetings of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, on Monday, Sept. 20, preceded by a dinner. The speaker was John W. Howard, casualty manager of Edwards, George & Co., Pittsburgh, on "Workmen's Compensation Law." After sketching the early history of compensations laws and the demand that has come up for such protection within the last few years, he said:

> The enforcement of workmen's compensation in Pennsylvania of course involves the expenditure of vast sums of money and naturally this stands out as an enticing bait to certain individuals in the formation of stock companies. We have had our attention called to at least two such companies, the stock to be solicited from and subscribed by manufacturers as prospective insurers. Glowing statements are made as to profits, even to the point of limiting the dividends to a certain magnificent percentage. No reference is made to the fact that there might possibly be heavy losses instead of profits. These companies hope to compete with established stock companies from the mere fact that they will not pay commissions to agents and will depend upon the mails for the solicitation of their business. It goes without saying that if you expect to have good protection from an insurance company, the company itself must be successful in the conduct of this business.
>
> A review of the history of casualty insurance companies reveals many cases of companies promoted in operation for a short time and then disappearing, and a compensation coverage in a company that does not prove to be permanent only throws the payment of the compensation back on the employer. The payment of compensation under the Pennsylvania act may run for a period of sixteen years, so that one of the first and most important points to be considered is the absolute permanency of the company.

A. O. Backert, secretary American Foundrymen's Association, was present and gave a talk on the coming convention of the association to be held in Atlantic City. He stated that the membership of the association is now nearly 1000, and that it has a comfortable balance in the treasury. He advocated strongly that members of local foundrymen's associations should also join the American Foundrymen's Association and make that body as strong in membership and influence as possible. Two new members were added to the Pittsburgh Association, these being the Flood City Mfg. Company, Johnstown, Pa., and the National Fuel Company, Pittsburgh, Pa.

The Alan Wood Iron & Steel Company announces that on and after Sept. 27 its offices will be located in the new Widener Building, Chestnut Street near Broad Street, Philadelphia, Pa.

All of the nine plants of the American Steel Foundries are operating except the one at Sharon, Pa., but not at capacity. Business is reported better in the West than in the East.

PERSONAL

Frank H. Buhl, a pioneer steel manufacturer of the Shenango Valley, who retired from active business some years ago, was given a highly flattering personal testimonial on Tuesday of last week at his home in Sharon, Pa., by many of the prominent citizens of that place and neighboring towns. On the day the testimonial was given the business places and schools were closed at 11 a. m., and the demonstration continued until midnight. Mr. Buhl was injured some time ago in an automobile accident and was not able to leave his room, but witnessed a parade in his honor from his bedroom window. The parade was made up of floats, automobiles and other vehicles, and it is said that fully 10,000 persons participated. A committee of citizens presented him with a very handsome mahogany clock as a testimonial of their regard. Mr. Buhl has presented to the city of Sharon what is known as the Buhl Farm, comprising 350 acres, now used as a playground, also the Buhl Club, besides other gifts.

President J. F. Welborn of the Colorado Fuel & Iron Company has appointed C. J. Hicks as executive assistant, with office in Denver. In addition to his duties as assistant to the president Mr. Hicks will give special attention to betterment work among the employees of the company.

H. S. Dent, who has been plant superintendent of the Alabama Consolidated Company for the past eight years at Ironton, Ala., has resigned that position and on Oct. 1 will take charge of the general sales department of the Talladega Foundry & Machine Company, Talladega, Ala.

Daniel Runkle has resigned as New York representative of the Standard Cast Iron Pipe & Foundry Company and has been succeeded by W. P. Mosteller, whose office will be located at 30 Church Street, in room 308. Mr. Runkle's plans for the future have not been announced.

R. T. Hodgkins has been elected manager of sales of the automobile division of the Studebaker Corporation at Detroit, Mich. He was for a long time manager of the hoisting machinery department of the Yale & Towne Mfg. Company, and while holding that connection served as chairman of the executive committee of the American Supply and Machinery Manufacturers' Association. He then became branch manager of the New York vehicle division of the Studebaker Corporation, and a year ago was transferred to Detroit and made assistant manager of sales.

C. H. Newcomb, resident manager of Crocker Brothers, Philadelphia, recently won the amateur trap shooting championship of the United States at a match in Chicago.

E. C. Robertson, who has been identified with scientific management in the plant of the H. H. Franklin Mfg. Company, Syracuse, N. Y., and elsewhere, has been appointed production manager of the Frantz-Premier Company, Cleveland, Ohio, manufacturer of vacuum cleaners.

George E. Scott, first vice-president, and J. C. Davis, fourth vice-president, of the American Steel Foundries, Chicago, returned from England Sept. 20, on the Rotterdam, after a sojourn of about two months. They witnessed the recent Zeppelin raid on London.

J. Norman Sherer has been appointed sales agent for the Producers' Coke Company, Uniontown, Pa., succeeding Richard Peters, Jr., who recently went with the William J. Rainey interest.

George A. Turville, now treasurer of the Crucible Steel Company of America, Pittsburgh, was elected secretary at a meeting of a board of directors held in Pittsburgh last week, and will fill both positions.

G. A. Swineford, president, treasurer and general manager of the G. A. Swineford Company, Canton, Ohio, and his brother, O. L. Swineford, secretary, have taken over $20,000 of the company's stock formerly owned by William Stuard and T. J. Maddrell, whose interests in the company ceased July 1. The company manufactures hardware specialties, consisting of shovels for various purposes, garden rakes and hay-handling devices. It reports a greater volume of business the past season and booked for the coming season than in its experience of over twelve years.

Robert Smalley, formerly of the Standard Roller Bearing Company, Philadelphia, and later superintendent of the Dunlop Wire Wheel Corporation, Long Island City, is now connected with the American Steam Gage & Valve Mfg. Company, Boston, Mass.

Charles D. West, Greenville, S. C., who has been manager of the West Hardware Company for the past ten years, has disposed of his interest in that company and is now connected with the Poe Hardware & Supply Company.

C. C. Todd has been elected vice-president of the Central Foundry Company, 90 West Street, New York. He was formerly manager of the company's Chicago branch.

John Calder, engineer for Willett, Sears & Co., and president Manufacturers' Equipment Company, Boston, is to preside at a session of the National Safety Council, Philadelphia, Oct. 20. The session is to be devoted to discussing safety provisions in the textile industry.

Ray S. Fox, well known to the iron and coke trade in the Central West, has joined the sales force of the Reliance Iron & Coke Company, Cincinnati, Ohio, and will travel through Ohio, Indiana and southern Illinois.

James G. Young, formerly with the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, has been appointed traffic manager of the Columbus Chamber of Commerce.

R. T. McCormick, sales manager of the Knox Pressed & Welded Steel Company, Pittsburgh, has resigned to become secretary and general manager of the McAleenan Brothers Company, Pittsburgh, builder of heavy steel plate work. The latter company has recently remodeled its plant and added considerable new equipment.

Colorado Fuel & Iron Company's Year

The annual report of the Colorado Fuel & Iron Company shows a deficit for the year ended June 30, 1915, of $334,661.49, as compared with a deficit in the previous year of $905,968.43. The following synopsis of the report has been furnished to the daily press:

Gross earnings from operation for the year ended June 30, 1915, were $16,578,039.76, a reduction of $1,224,965.45 as compared with the previous year, all but about $25,000 of which occurred in the iron department. Operating revenues were $14,812,981.35, a decrease of $1,916,273.90; and net earnings from operation were $1,765,058.41, an increase of $691,288.45. The income from sources other than operation was $496,042.63, making the total net income $2,261,101.04. Bond interest, taxes, sinking funds and other charges against income amounted to $2,595,762.53, resulting in a deficit of $334,661.49, as against a deficit of $905,968.43 in the previous year.

The reduction in sales was due to a curtailment in the consumption of coal in all of that territory supplied from Colorado and to lighter purchases of steel by railroads.

While some improvement is anticipated in the near future it is not believed that the business will be such as to enable the company to work all of its coal mines to their capacity, even during the winter months.

During the period of reduced consumption of coal, extending now over two years, development of new coal properties in Colorado has continued, with the result that the productive capacity of developed mines producing domestic coal in the State is at least twice the present demand and far in excess of the prospective demand for some years.

FAVOR ANTI-DUMPING LAW

Tariff Commission Sentiment Also Gaining Ground—Administration Support

WASHINGTON, D. C., Sept. 21, 1915.—Influential majority leaders in Congress are giving serious attention to a project intended to meet the demand of producers throughout the country for increased protection against the anticipated flood of surplus products from Europe when the war is over without incurring the political dangers which almost invariably accompany tariff revision on the eve of a Presidential election. The plan is also designed to meet the insistent call from many sections for prompt assurances that the many incongruities and inadequate rates in the Underwood-Simmons law shall be remedied in the very near future.

The new plan proposes the enactment by Congress early in the coming session of a single measure embodying an anti-dumping clause and authorizing the appointment by the President of a tariff commission clothed with fairly comprehensive powers. The anti-dumping clause, it is contended, would meet not only the special demand growing out of the fear of domestic producers that American markets will be deluged with the surplus output of English, German and French factories as soon as the war is over, but would automatically furnish a larger measure of protection for many industries than is afforded by the schedules of the present tariff law against current importations from other countries which are brought to the United States to be sold at much lower prices than they would command in the countries of origin.

Advocates of the proposed legislation to prevent dumping confidently count upon the assistance of the Administration to support the measure in Congress and in this connection point to the highly significant formal interview given to the press during the past week by Dr. Thomas H. Norton, expert on chemical industries of the Department of Commerce, who suggested that certain dyestuffs now on the free list be given a moderate duty of 15 to 20 per cent in order that their production in the United States may be made sufficiently profitable to justify American capital in taking up their manufacture. Dr. Norton also comments upon the significant fact that some of the largest consumers of dyestuffs in the United States, who heretofore have opposed the imposition of duties on these products, have learned from the bitter experience of the European war that it is better to pay a slightly higher price for their supplies and to be assured against interruption than to rely upon foreign manufacturers who, in times of great emergency, may find themselves unable to take care of their American customers. Without an anti-dumping clause American capital would not be justified in going into the business, but with guarantees against the competition of enormous surplus output enterprising manufacturers are now ready to build factories and to take the chance that Congress in the near future will make such a revision of the chemical schedule as would permit the complete diversification of this important industry in this country.

The suggestion of a tariff commission appeals very strongly to certain of the majority leaders. The majority in the House of Representatives is now so small and the outlook for 1916 so uncertain that the prospect of passing a new partisan tariff law is far from encouraging. If the new tariff must be a compromise, it is regarded as highly important that the revision should be made by experts.

Another strong argument in favor of the creation of a tariff commission at this time is the contention of the majority leaders that the Underwood-Simmons law requires rather the scientific re-adjustment of its details than the abandonment of the principles upon which it is based and the adoption of a new method of fixing rates. Majority leaders appreciate the desirability of placing the tariff in the hands of a commission of experts in the event that the Republican party is successful at the polls in 1916, as that would mean, in the absence of a tariff commission, a revision of the tariff on protective lines.

Both the anti-dumping clause and the tariff commission are in line with the dire necessity of the Government for more revenue and it is believed that if they receive the indorsement of the Chief Executive Congress will speedily comply with his recommendations.

W. L. C.

OBITUARY

CLARENCE METESSER, Johnstown, Pa., died at the home of his parents at Ridley Park, Philadelphia, Sept. 14, aged 42 years. He was assistant superintendent of the Gautier Department of the Cambria Steel Company. About a year ago he was compelled to undergo an operation, which was performed at a local hospital, but after a few months he was obliged to submit to another, which occurred in Philadelphia. Although the second operation had resulted so successfully that he was discharged from the hospital, his death followed about a fortnight after. He was of Southern birth, was graduated from Tulane University, New Orleans, and engaged in the iron business with his father in New Orleans and later in Kentucky. He then went to Hamilton, Ohio, where he was employed as a draftsman and in 1910 entered the employ of the Cambria Steel Company. He leaves his widow and a son.

CORNELIUS J. FIELD, a prominent electrical and mechanical engineer, died Sept. 20 at his home in Brooklyn, N. Y., aged 54 years. He was born in Chicago, was graduated from Stevens Institute in 1886, and after serving for some time as a draftsman rose to become chief engineer and general manager of the Edison Company of Brooklyn, retaining this position until 1891. He then went into construction work and built electric railroads in numerous cities and in foreign countries. In 1909 he became associated with Thomas A. Edison, who had at that time perfected his storage battery for traction use.

JAMES A. SMYSER, Baltimore, Md., of the firm of E. G. Smyser's Sons, operating the Variety Iron Works at York, Pa., died Sept. 19 at a Baltimore hospital, aged 66 years. He was born in York, and his father was the founder of the firm, building up a large business. Because of much work coming from Baltimore and vicinity an office was opened in that city, with James A. Smyser in charge. He soon won a place in business circles, becoming president of the Builders' Exchange Building Company and of the Columbia Paper Bag Company. He also was a director of the First National Bank. He leaves his widow.

J. MICHAEL GARVERICH, Lucknow, Pa., inventor of the patent car door used by the Pennsylvania Railroad, automatic couplers used by leading railroads and other devices, died Sept. 11, aged 73 years.

Locomotive Orders Growing

The Erie Railroad has placed orders for 28 locomotives in addition to the 5 reported ordered early in September. Of the 33, the American Locomotive Company will build 18; the Baldwin Locomotive Works, 10, and the Lima Locomotive Corporation, 5. The latter builder has also an order for 3 locomotives from the Ann Arbor. The Buffalo, Rochester & Pittsburgh is also reported to have ordered 10 from the American Locomotive Company. These make a total of about 135 locomotives ordered within two weeks, all domestic except 25. Inquiries approximate 100.

The Swedeland furnace of the Alan Wood Iron & Steel Company, at Swedeland, Pa., which has been out of blast since July 13 because of its burning through at the bottom, will be blown in this week. It makes from 270 to 300 tons per day.

Pittsburgh and Nearby Districts

The Russian Imperial Railways Commission, said to be the first body of its kind to visit this country, was the guest in Pittsburgh last week of the Pennsylvania Railroad and the Pressed Steel Car Company. The commission visited some of the large manufacturing plants, including the works of the Pressed Steel Car Company, now at work on a contract for nearly 7000 cars for Russia. On Thursday evening a dinner was given at the Duquesne Club to the commission, attended by many of the leading steel manufacturers. The members of the commission expressed themselves as amazed at the magnitude of the manufacturing plants in the Pittsburgh district and were highly pleased with the progress made in building the Russian cars. The commission is composed of Count S. I. Shulenburg, president; Max N. Groten, Nicolai P. Kemmer, Alphons I. Lipetz and Arkadi G. Martynoff.

The S. R. Smythe Company, House Building, Pittsburgh, has been appointed consulting engineer for the complete erection of the new open-hearth steel plant of the United Steel Company, Canton, Ohio. The plant will include five 75-ton open-hearth furnaces, and provision will be made for seven more. There will be 18 4-hole soaking pit furnaces, six gas producers of the Hughes type, blooming mill, sheet-bar mill and everything else necessary to make the plant complete. The Smythe Company will build the open-hearth and soaking pit furnaces and probably the gas producers and will sublet contracts for the blooming and sheet-bar mills and other equipment. The new plant is expected to be ready about July 1, 1916, and will make from 800 to 1000 tons of steel per day. Most of it will be put into sheet bars to be used by the United Steel Company in its sheet mills and the remainder sold in the open market.

The Brier Hill Steel Company, Youngstown, Ohio, which recently took a French order for 50,000 tons of 6 x 6 in. high carbon billets, is erecting a temporary building at its open-hearth steel plant for the purpose of providing special testing facilities for them. The steel is to be of special analysis, and each heat is to be tested before being rolled.

C. H. Vaughan, second vice-president and chief engineer, and H. R. Hortenstine, contracting manager, of the Penn Bridge Company, Beaver Falls, Pa., have bought the plant of the York Bridge Company, York, Pa., and have formed a new corporation to be known as the York Bridge & Construction Company. Some minor additions will be made to the plant by the new owners, who will carry on a general structural business and will erect steel bridges, steel coal tipples and other lines of work. Mr. Vaughan will resign from the Penn Bridge Company Oct. 1, and Mr. Hortenstine about Nov. 1.

Mackintosh, Hemphill & Co., Pittsburgh, in addition to a contract for a 26-in. tilting Lamberton mill, secured from the United Steel Company, Canton, Ohio, about two months ago, have been given a contract for a 35-in. motor-driven blooming mill.

The first heat in one of the two new open-hearth steel furnaces of the Pittsburgh Crucible Steel Company, Midland, Pa., was made on Monday, Sept. 20. Bottom for the other furnace is now being made and it is expected to start inside of two weeks. These two furnaces will give the company a total of eight 60-ton open-hearth furnaces, six basic and two acid, seven of which are in operation.

No. 2 blast furnace of the LaBelle Iron Works, Steubenville, Ohio, will go in blast early next week. It will make about 400 tons of basic iron per day.

In addition to the contracts for extensions placed by the Youngstown Sheet & Tube Company, Youngstown, Ohio, noted in THE IRON AGE of Sept. 16, the company has given large contracts for electrical equipment to the General Electric Company, Schenectady, N. Y. The first contract calls for three 1500-kw. direct current turbo-generators to be used at the power house in Struthers, in connection with the new bar mills. The second contract calls for one 5000-kw. alternating current turbo-generator, to be an additional unit in reinforcing the power required at the company's blast-furnace plant. These turbo-generators are among the largest built by the General Electric Company. The Sheet & Tube Company is installing four bar mills, to be supplied by the Morgan Engineering Company, Worcester, Mass. A fifth bar mill has been moved from Wheatland, Pa., and will roll iron skelp exclusively. All these mills will be driven by electricity.

The William Tod Company, Youngstown, Ohio, has received a contract from the Bethlehem Steel Company, South Bethlehem, Pa., for a 46 and 76 x 72 in. twin tandem compound reversing blooming-mill engine, similar to the one it furnished to the Brier Hill Steel Company, a description of which appeared in THE IRON AGE of April 1, 1914. The engine will be used for driving the large mill of the Bethlehem Company on which Grey sections are rolled, and will replace a smaller Tod engine now used in driving this mill, but which will be moved and used for driving a new beam mill, now being installed. The strike of men employed in the hydraulic press department of the plant of the Tod Company has been satisfactorily settled to both sides, and all the men are back at work.

The Republic Iron & Steel Company, Youngstown, Ohio, has placed an order for the pipe-forming machinery for its new butt and lap weld furnaces with the United Engineering & Foundry Company, Pittsburgh. The Republic Company will itself build the furnaces. The butt weld furnace will turn out pipe from ⅛ to 3 in. and the lap weld furnace from 8 to 16 in. At present the Republic Company makes lap weld pipe only up to 12 in. in diameter. These two furnaces will increase the pipe capacity of the Republic Company about 50 per cent, giving it a monthly capacity of about 10,000 tons of pipe when running full. The company has almost completed the new 75 Koppers by-product coke ovens, and will then have a total of 143, with a monthly capacity of about 60,000 tons of coke. It will then probably abandon operations at some of its beehive ovens in the Connellsville region.

It is stated that the Driggs-Seabury Ordnance Company, Sharon, Pa., has taken contracts the past week for war munitions to the value of about $8,000,000. More than 30,000 tons of steel will be needed to fill these orders, one of which is for 6-in. shells. This company is equipped to manufacture shells and some forms of ordnance, but the new owners expect to make some material additions to the present equipment, and it is stated that a crucible steel plant will likely be installed for the purpose of making special steels for certain parts of large guns and also for rifles.

Hubbard & Co., Pittsburgh, manufacturers of shovels, spades, scoops and railroad track tools, have recently put on the market a corrugated steel cleat, for holding the heads of barrels and kegs. The cleat is made of No. 22 stamping steel. Strong claims are made for its cheapness of cost and the quickness with which it can be applied to the barrel or keg.

The Carnegie Steel Company, Pittsburgh, is in the market for three 5-ton electric cranes to be installed in its Schoen forged steel wheel works at McKees Rocks, Pittsburgh.

The George J. Hagan Company, Pittsburgh, reports an active demand for underfeed stokers, recent contracts having been taken for manufacturing plants in various parts of the country.

The quantity of beehive-oven coke used in the blast furnaces in the Youngstown district is rapidly diminishing. The Republic Iron & Steel Company and the Youngstown Sheet & Tube Company will soon be using by-product coke exclusively, while the Brier Hill Steel Company, which has for some time been figuring on by-product ovens, will probably place a contract for their construction in the near future. The Carnegie Steel Company uses beehive coke at its six furnaces in Youngstown and will probably continue to use this class of coke for some time.

Machinery Markets and News of the Works

RAILROADS MORE ACTIVE

Western Lines Buying for Shop Repairs

Demand for Heavier Lathes Continues to Develop—Industrial Demand Improving Despite Deliveries and Prices

Indications are that the railroads, which have been showing greater activity in the purchase of locomotives, cars, rails and bridge work, will come into the market to a greater extent for machine tools and shop equipment at an early date. The forerunner of this demand is the undertaking of extensive shop repairs, in which the Western lines lead. Chicago reports that the Illinois Central, the Lake Erie and the Santa Fe already have bought equipment. The Illinois Central is to make improvements to its Waterloo, Iowa, shop to cost $180,000. Armour & Co. are to make extensive improvements to their car shops at South Omaha. The Chicago & Northwestern Railroad will purchase conveyors, motors and other equipment for its new grain elevator at Milwaukee. The Lake Erie & Western is planning the erection of new shops at Tifton, Ind.

The demand for large engine lathes capable of making 8-in. to 9-in. shells continues to develop. The Milton Mfg. Company, Milton, Pa., is reported to have purchased 300 lathes of 24-in. swing and larger, to enable it to fill an order for 1,000,000 six-in. shells. Cleveland finds that the demand for the smaller sizes of machine such as are used in making 3-in. shells, had fallen off because of delayed deliveries, but this is offset by the call for the larger sizes of lathes. The production of many single purpose lathes is expected to relieve the first situation. An Illinois manufacturer of special lathes has taken an order for 2600 to be delivered as rapidly as possible. The Cisco Machine Tool Company, Cincinnati, reports orders in the past few weeks aggregating 1700 lathes, all for export. The C. W. Raymond Company, Dayton, Ohio, is reported to be in the market for 50 lathes.

The domestic inquiry for one or small groups of machine tools for industrial purposes is improving in many directions, and sales are being made despite the extended deliveries, and the higher prices now asked for machines. The Cleveland Punch & Shear Works Company, Cleveland, Ohio, has let a contract for buildings which will greatly increase its capacity.

Notable items in the markets include the following: The H. Clauss Mfg. Company, maker of cutlery, Fremont, Ohio, is in the market for drilling machines, tapping machines, punch presses, electric motors, power equipment, etc., for a new plant. The H. J. Reedy Elevator Company, Cincinnati, Ohio, has purchased the plant of the National Lathe Company, Batavia, Ohio, and has moved the equipment to Cincinnati. The company's output of 13-in. and 17-in. lathes will be doubled. The Pawling & Harnischfeger Company, Milwaukee, has received an order for nineteen 5-ton wall cranes for the William Cramp & Sons Ship & Engine Building Company, and for eleven inside and yard cranes for the Bethlehem Steel Company.

The Poole Engineering & Machine Company, Woodberry, Md., has filed plans for the erection of a large one-story machine shop to cost about $150,000. The Firestone Tire & Rubber Company, Akron, Ohio, will equip a plant at Kansas City, Mo. to cost about $200,000. The J. I. Case Threshing Machine Company, Racine, Wis., will erect a two-story addition to its plant at Billings, Mont., to cost about $100,000.

In the Pacific Northwest export trade is still hampered by the shortage of ocean cargo space. Machine tool stocks in San Francisco are greatly depleted, and delayed deliveries are holding buyers back.

New York

NEW YORK, Sept. 21, 1915.

Dealers report a much more active inquiry on the part of domestic manufacturers for from one to three machine tools for uses not associated with the war, and orders are being placed despite the extended deliveries and higher prices now asked. As for the war business, there is continued evidence that the demand is now for the larger lathes, principally 22-in. to 24-in. swing. These are the sizes most mentioned by exporters, especially.

The indications are that from now on more orders will be placed here for shells 6-in. in diameter, and larger. The Milton Mfg. Company, Milton, Pa., is reported to have secured an order for 1,000,000 6-in. shells, and to have already installed a part of 300 engine lathes of 24-in. and larger swing. The regular line of the company is nuts, bolts and forgings.

Large buying of tools for export to England, November or December delivery, has been done by Gaston, Williams & Wigmore, 140 Broadway, New York. This firm has exported large quantities of automobile trucks, steel rails and general equipment in recent months.

The Topton Foundry Company, Topton, Pa., is in the market for eight or ten large turret lathes for manufacturing a new malleable iron coupling.

The Hall Switch & Signal Company, Garwood, N. J., is inquiring for ten automatic screw machines of 1¼-in. to 2-in. spindle capacity.

The latest firm to take up the manufacture of lathes is the Earle Gear & Machine Company, Philadelphia, Pa. Machine tool manufacturers, as a rule, are endeavoring to protect their regular trade by distributing their output as far as possible. In other words, where they have only a few tools on hand they will not sell the entire lot to one purchaser. Second-hand machinery continues to turn up in unexpected directions, and is selling well at good prices. In many cases several profits are made between original seller and ultimate buyer, especially where the machine is for export.

Northern New Jersey, in the vicinity of Elizabeth, is suffering from the strike fever, at least three large plants being tied up, while others are threatened.

W. E. Welborne, Hotel McAlpin, New York, desires to get in communication with firms equipped to make shrapnel rings of copper, cartridge disks, cups for sheathing bullets, shrapnel cartridge cases; also large lathes with beds up to 23 ft. for heavy gun work, and plain and universal millers which can be shipped promptly.

The Meurer Brothers Company, 567 Flushing Avenue, Brooklyn, N. Y., manufacturer of tin plate, ventilators, metal shingles, etc., is putting up a frame addition to its plant, 100 x 160 ft., one story, to be used as a machine shop. It will cost about $10,000.

The Curtiss Aeroplane Company, Buffalo, has let general contract to the John W. Cowper Company, engineer, for a four-story addition, 80 x 300 ft., to its aeroplane plant at Churchill Street and the New York Central Railroad.

The Candee Incubator Company, Syracuse, N. Y., is having plans prepared for a manufacturing plant, 100 x 450 ft., one story, which it will erect at Solvay, N. Y.

The Buffalo Oil Burner Company, Buffalo, has been incorporated with a capital stock of $100,000 to manufacture oil burners. George N. Hughes, Jerret and Jessie Van Daam, 184 Franklin Street, are the incorporators.

The Shepherd Crane Hoist Company, Montour Falls, N. Y., has let contract for construction of a one-story addition to its plant, 125 x 200 ft. The structural steel contract was awarded to the Montour Steel Works.

The Atlas works of the Standard Oil Company, Buffalo, H. P. Chamberlain, general manager, has let contract for a steel and brick boilerhouse to be added to its plant at Elk and Babcock streets and the Buffalo Creek Terminal Railroad.

The McKinnon Chain Company, manufacturer of electrically-welded chains, Tonawanda, N. Y., has awarded contract for a brick and concrete addition to its plant at Fillmore Avenue and the Erie Railroad, 80 x 90 ft., to cost $10,000.

The Eastman Kodak Company, Rochester, is taking bids for factory additions, 45 x 140 ft., two stories and basement, and 80 x 165 ft., five stories and basement.

The Fibre Corporation, Lockport, N. Y., has plans in preparation for the rebuilding of its plant which was partly destroyed by fire some time ago. The total estimated cost is $60,000.

Pratt & Lambert, Inc., varnish maker, Buffalo, has filed plans for a brick addition to its plant at Tonawanda Street and the New York Central Railroad.

The Buffalo Cold Storage Company, Buffalo, Daniel E. Knowlton, president, will build a powerhouse at a cost of $45,000, in connection with a ten-story cold storage warehouse it is erecting at Perry and Columbia streets and the Lehigh Valley Railroad.

The Frazer & Jones Company, 351 West Fayette Street, Syracuse, maker of iron castings, will soon start work on two additional buildings, each 250 x 354 ft., at its plant, Solvay, N. Y., at an estimated cost of $100,000.

The Davis Foundry Company, Hornell, N. Y., is completing plans for a two-story addition to its foundry, 40 x 100 ft., and for two coke ovens, 22 x 30 ft.

The Jewell Steel & Malleable Company, Buffalo, is building a coreroom addition, 64 x 80 ft., one story, at its plant, Hertel Avenue and the New York Central Railroad.

Pass & Seymour, Inc., Solvay, N. Y., has plans in preparation for an addition to its factory.

The Atlas Steel Casting Company, Buffalo, has let contract for an addition to its foundry at Elmwood Avenue and the Erie Railroad. It will be of structural steel and brick.

The Selden Motor Vehicle Company, Rochester, is excavating for an addition to its factory on Probert Street.

The John W. Danforth Company, Buffalo, has received contract for constructing and installing a central heating system plant for Cornell University, Ithaca, at a cost of $35,000.

The American Radiator Company will build a two-story brick and steel addition to its thermal research laboratory at its Pierce plant at Elmwood Avenue and the New York Central Railroad Belt Line.

The Higgins Memorial Hospital, Olean, N. Y., has let contract for construction of a two-story powerhouse to cost $16,000.

Bids are being received by the State hospital commission, Albany, for powerhouse equipment and heating apparatus for the Middletown State Hospital, Middletown, N. Y. E. S. Elmwood is secretary.

The Morrow Mfg. Company, Elmira, N. Y., has let contract for a one-story addition, 60 x 140 ft., to be made to its plant.

The Gleason Works, Rochester, has let contract for erection of powerhouse, 32 x 49 ft., to be added to its plant on University Avenue.

The New York Central Railroad Company is building a boiler house to cost $25,000, at its locomotive repair shops, Depew, N. Y.

The Lackawanna Railroad Company has filed plans for construction of a power station on Ohio Street, in connection with its new passenger terminal at Buffalo.

The American Locomotive Company is building an addition to its oxy-acetylene generating plant, at its Brooks Works, Dunkirk, N. Y.

New England

BOSTON, MASS., Sept. 20, 1915.

New England has seen little development of new enterprises the past week. Matters not held in abeyance by present or prospective labor troubles were laid aside to wait the cessation of the high temperature which prevailed constantly the entire week. Factories and schools were compelled to close through the heat of the day in nearly all parts of New England. In spite of the uncertainty of the existing labor situation, the expansion of manufacturing plants continues to be a feature of the industrial news.

The daily press has been filled with stories of the march of the 8-hr. day agitation through Connecticut, Rhode Island and Massachusetts. The factories in Bridgeport and Springfield have largely adopted the shorter hours schedule but some of the machine and machine tool plants of Waterbury, New Britain, Worcester and Providence are involved in labor troubles which are as yet unsettled. In Springfield, the employees of the Smith & Wesson plant were asked to vote on the question of whether they preferred an 8-hr. day without overtime or a 55-hr. week with a bonus. As a result of the vote the plant will go on a 48-hr. week, beginning Jan. 1, 1916. The Knox Motors Company and Barney & Berry, Inc., will start on an 8-hr. schedule on Oct. 4.

The employees of the New Departure Mfg. Company, Bristol, Conn., voted Sept. 19 to accept the company's offer of a 50-hr. week with 57½ hr. pay and time and a quarter for overtime. Officials of the company are quoted as stating that construction work on the large additions would be resumed Sept. 21. The employees of the Excelsior Needle Company, the Standard Company and the Progressive Mfg. Company, Torrington, Conn., have accepted the offer of a 55-hr. week and a ten per cent increase in wages. The Max Ams Company, Fairfield, Conn., has granted its employees a 48-hr. week with 56 hr. pay.

The problem of the manufacturers is somewhat complicated by the activities of the agents of the munition plants who are offering big inducements to employees to leave their present jobs by promises of more pay and shorter hours. Some of the larger plants, however, do not look upon the 8-hr. day and the higher rate of wages as altogether a calamity. Here and there one finds a manager who believes that the 8-hr. day, particularly when the shop is run upon a two-shift, 16-hr. basis, is a sound economic proposition, and will, after a period of adjustment, be found profitable rather than the reverse.

The foundations for the new buildings of the Metal Products Corporation, Providence, R. I., are going along rapidly. There will be no addition to the power installation.

The Wilkins Toy Company, Keene, N. H., is to erect a building, 32 x 300 ft., one and two stories, and a boiler house, 44 x 36 ft., one story.

The Wright Wire Company, Worcester, is adding one story, 70 x 107 ft., to its plant at Palmer, Mass.

The Mead-Morrison Mfg. Company, East Boston, Mass., has awarded a contract for a three-story pattern shop, 85 x 152 ft., to be erected on Prescott Street.

The Clark Brothers Bolt Company, Milldale, Conn., has awarded a contract for an addition to its factory.

Work has been started on an addition, 56 x 85 ft., one story, to the plant of the Moera Mfg. Company, maker of hardware and auto supplies, Griggs Street, Waterbury, Conn.

The Seymour Mfg. Company, Seymour, Conn., maker of brass goods, has awarded a contract for a two-story addition to its factory.

The Ashcroft Mfg. Company, Bridgeport, Conn., has awarded contract for a concrete building on Kossuth Street, 20 x 49 ft., five stories, with ells 19 x 46 and 41 x 50 ft.

The Winchester Repeating Arms Company, New Haven, Conn., has awarded a contract for the erection of a factory building, 54 x 414 ft., five stories, on Winchester Avenue.

The Eastern Machine Screw Corporation, New Haven, Conn., is building an addition to its plant on Truman Street, 50 x 100 ft., one story.

It is reported that Gray & Davis, Boston, Mass., manufacturers of electric equipment for automobiles, have received a substantial order for high-explosive shells.

The Hartley Clock Company, capital $500,000, has been incorporated at Boston, Mass., by John S. Hartley, William C. Coveney and Robert Gallagher.

The Springfield Foundry Company, Springfield, Mass., has secured a permit for the erection of a finishing and shipping building on Suffolk Street and for two pattern buildings.

The Connecticut Blower Company is a new Hartford, Conn., corporation with an authorized capital of $50,000, $26,000 paid in, which will take over the business of the Hart-

ford Sheet Metal Works. The incorporators are C. H. Keeney and M. E. Keeney of Avon and J. H. Strong, Hartford.

In accordance with a vote of the directors, a special committee of the Chamber of Commerce, Hartford, Conn., met Sept. 17 to discuss the plans for another chamber of commerce building, which, it is understood, will be similar to the one now occupied by the Arrow Electric Company.

The Cushman Chuck Company, Hartford, Conn., is planning to build at once a one-story addition, about 60 x 130 ft., for the manufacture of small tools.

The American Emery Wheel Works, Waterman, East River and Pitman streets, Providence, R. I., are completing large additions, including a new third floor office, 50 x 100 ft. The remainder of the third floor, approximately 50 x 200 ft., together with the first floor space vacated as offices, has been released for additional factory purposes. A new kiln building and four additional 15-ft. kilns are being erected. All necessary equipment, including a new elastic oven, gravity elevator system, etc., has been purchased.

At a meeting of the directors of the Billings & Spencer Company, Hartford, Conn., Sept. 16, it was voted to increase the capital of the company from $200,000 to $500,000. As the present charter of the company limits the capitalization to $500,000, the directors voted to organize a new corporation to take over the business and assets of the present company. A meeting of the stockholders has been called for Oct. 26 to act upon the directors' plan.

Philadelphia

PHILADELPHIA, PA., Sept. 20, 1915.

Work on the addition of three stories to the No. 2 machine shop of the Bethlehem Steel Company, is in progress according to the South Bethlehem, Pa., dispatch. The steel work on this addition represents 4000 tons. When this shop addition is completed the working force will be increased by 1500 men.

The Philips Pressed Steel Pulley Works, Fourth Street and Glenwood Avenue, Philadelphia, Pa., announces that it will be established in its new factory at Chestnut Hill, Pa., in the course of a month.

The Hess-Bright Mfg. Company, Front Street and Erie Avenue, Philadelphia, Pa., has plans completed for the construction of an addition to its hardening plant, 40 x 60 ft. Watson & Huckle, 1211 Walnut Street, Philadelphia, are the architects.

The department of public works, Philadelphia, Pa., will receive bids until Sept. 30 for a turbo-centrifugal pump, stoking equipment, etc.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, Pa., is in the market for a second-hand turntable, 50 ft. long, of 40 tons capacity or heavier, and for one second-hand triple-drum direct current hoisting engine, either 7 x 16 or 8½ x 16.

It is reported that, due to the rush orders for mine cars and mining machinery, the Benjamin Steel & Iron Company, Hazleton, Pa., has put its force on a 12-hr. a day shift.

The building committee of the asylum for criminal insane at Fairview, Pa., has awarded a contract aggregating $500,000 for new buildings. T. J. Hurley Company, Bayside, L. I., N. Y., is the general contractor. F. Faith & Co., 2427 Pennsylvania Avenue, Philadelphia, Pa., was awarded contract for heating, ventilating and plumbing equipment. The new structures will include a ward, engine-room, etc.

It is reported that the Baldwin Locomotive Works, Eddystone, Pa., is manufacturing 300 automobile tractor trucks for Russia, each to be used to draw several miniature flat cars over highways.

The Commercial Box & Envelope Company, Chester, Pa., recently removed from Binghamton, N. Y., has installed additional machinery in its new plant and has begun operations with 100 more hands, making about 500 on its payroll.

The plant of the Harrington Water & Light Company, Harrington, Del., was almost totally destroyed by fire Sept. 11, the damage amounting to about $8,000. All of the machinery was destroyed. The headquarters of the company are at Reading, Pa.

It is reported that the Merchant & Evans Company, 517 Arch Street, Philadelphia, Pa., manufacturer and dealer in tin plate, has purchased the storage yard of the former Fulton-Walker Lumber Company on Washington Avenue, comprising a site about 60 x 175 ft., of irregular shape, adjoining its factory and warehouse. It will be improved to afford the company additional factory space.

Plans are being drawn for a baking plant, including a power plant, for the William Freihofer Baking Company, Twentieth and Indiana streets, Philadelphia. Peuckert & Wyeder, 310 Chestnut Street, are the architects.

Baltimore

BALTIMORE, MD., Sept. 20, 1915.

A joint power and storage building, covering an area of 30,000 sq. ft., will be built as an addition to the Baltimore warehouse of the Carnegie Steel Company. William Whigham, assistant to the president of the company, and John Hulst, chief mechanical engineer, conferred with H. D. Bush, the superintendent, and will submit their recommendations to the officials in Pittsburgh.

The Bartlett-Hayward Company, Scott and McHenry streets, Baltimore, which is building a new plant at Dundalk, Md., to fill large war orders, has taken over twenty-one additional lots near its present plant. Work on the new building is progressing rapidly. Plans for a dryer-house, 35 x 91 ft., have been filed.

Through Leon Rasst the Spanish-American Trading Syndicate has purchased the plant of the Mount Vernon Brewery, Ridgely Street, Baltimore, and will remodel it for use as a guncotton manufacturing plant, the work to be completed within a few months. Announcement is made that it has purchased land near Wilmington, Del., upon which will be erected a plant for the manufacture of shrapnel cases.

Four additional buildings to be used as a by-products plant are to be erected at Curtis Bay, Md., as a part of the new plant of the United States Industrial Alcohol Company.

Plans filed by the Poole Engineering & Machine Company, Woodberry, Md., call for the erection of a one-story machine shop, 104 x 280 ft., at Woodberry and Railroad avenues, Woodberry, to cost about $150,000.

Many rumors are heard in regard to the plant of the Baltimore Car Wheel Company, Fulton Station, Baltimore, which has been idle for some time. It is said an effort to purchase the plant is being made. Some definite announcement is looked for within the next few days.

The Baltimore Car & Foundry Company, Curtis Bay, Md., has purchased a small piece of ground adjoining its property but no announcement of additions has been made as yet.

Contractors are bidding on the construction of superstructure of the new machine shop which will be built in the marine department of the Maryland Steel Company, Sparrows Point, Md. The contract for the substructure has been awarded to the Raymond Concrete Pile Company, Munsey Building, Baltimore.

Henry Adams, consulting engineer, Calvert Building, Baltimore, has completed plans for a central heating station for fifty dwellings being erected on the Reisterstown Road. The building will be one story, of brick and concrete, 33 x 70 ft.

The Eastern Garage Company, 405 South Highland Avenue, Baltimore, plans to establish a garage at Presbury Street near Bentalou Street.

The two-story addition to the plant of the Baugh Chemical Company, Clinton and Eleventh streets, Canton, Md., is to be used as a sulphuric acid plant with a daily capacity of 90 tons.

Work is being rushed on a new powder mill for the DuPont Powder Company, Wilmington, Del., to replace one destroyed by explosion.

Indications are that a new industry will shortly occupy the site formerly used by the National Tube Company, New Castle, Del.

Plans to double its output are being made by the H. A. Burke Company, pipe organ manufacturer, Cumberland, Md.

The Prince George Electric Light & Power Company, Hopewell, Va., has been incorporated with $100,000 capital stock. W. H. Hoyt is general manager.

Prices on lathes, other machine tools, motors, shaftings, pulleys and wood-working machinery are being sought by F. P. Hudgins, 16 East Marshall Street, Richmond, Va.

Lee & Eastwood, Times-Dispatch Building, Richmond, Va., are seeking prices on machinery for the manufacture of file handles.

John H. Heald & Co., Dandy Hook, Va., will be in the market for four additional boilers, work on a new boiler-room to be started immediately.

The George A. Boyden Pump Company, Baltimore, Md., has been incorporated with $1,500,000 capital stock to manufacture pumps, pump machinery, contract for and erect pumping stations, manufacture marine equipment and machinery generally. The incorporators are George A. Boyden, Mount Washington, Md.; J. Hill Dawson and Janon Fisher. Offices have been opened in the Munsey Building, Baltimore, and a site for a plant now is being sought.

Chicago

CHICAGO, ILL., Sept. 20, 1915.

More machine-tool business from the railroads seems likely in view of shop repairs and extensions that are being undertaken at various points. The Illinois Central, the Lake Erie & Western and the Santa Fé roads are planning work of this kind and have already bought some equipment. In the week past the Italian representative of the Ingersoll-Rand Company has been buying screw machines, lathes and milling machines in this market for shipment to the Italian works of that company. Other foreign buyers have been combing the market for used machinery. Common report has it that a large number of sub-contracts for war materials which have been in abeyance thus far, pending financial guarantees, will become operative next week. An Illinois manufacturer of special lathes has taken an order for 2600 to be delivered as rapidly as possible.

The Royal Metal Mfg. Company, Chicago, has been incorporated with a capital of $50,000 by Joseph Salomon, Johanna K. Salomon and Max Klee, 1340 East Forty-eighth street.

Bids are being taken by T. J. Campbell, 6241 Ashland Avenue, Chicago, on a one-story machine shop, 50 x 135 ft. A. G. Lund, 810 West Sixty-third Street, is the architect.

W. R. Moorhouse, commissioner of public works of the city of Chicago, will receive bids until Sept. 21 for a 20-ton electric traveling crane with 5-ton auxiliary hoist, for the Mayfair pumping station.

The Chicago Automatic Screw Machine Company, Kinzie and Oakley streets, Chicago, is building additions to its plant which will approximately double its manufacturing capacity.

The Hump Hair Pin Company, Chicago, S. H. Goldberg, president, has purchased property at Prairie Avenue and Twentieth Street on which it will build a factory to cost $150,000.

The H. Mueller Mfg. Company, Decatur, Ill., is taking bids on a one-story factory, 66 x 152 ft.

A. J. Holtz of the Rockford Watch Company, will become president of the reorganized Forest City Wire Works, Rockford, Ill., the capital of which company has been increased to $25,000.

Announcement has been made that the reorganized Rumely Company, to be known as the Advance-Rumely Company, will open its Battle Creek plant this fall. It will manufacture threshing machinery, as before, and a small oil-pull tractor.

The Steelclad Auto Bow Company, Chicago, Ill., will locate in the plant of the Holland Mfg. Company, Grand Rapids, Mich. It has a capital stock of $50,000.

The Brown Sheet Iron & Steel Company, Minneapolis, will build a two-story building, 75 x 100 ft., at Berry Avenue and Pearl Street, St. Paul, Minn., which it will occupy as soon as it is completed for the manufacture of welded steel barrels and tanks.

The Illinois Central Railway Company is to make improvements to its shops at Waterloo, Iowa, which will cost $180,000. A. S. Baldwin, Chicago, is the chief engineer.

The Iowa Railway & Light Company plans an expenditure of $60,000 on the reconstruction of its electric plant at Perry, Iowa. William G. Davis, Cedar Rapids, Iowa, is president and general manager.

The plant of the Kelly Mfg. Company, Sioux City, Iowa, which was recently destroyed by fire, will be immediately rebuilt.

Armour & Co., Chicago, will make improvements to its plant at South Omaha, Neb., costing in the neighborhood of $250,000. This will include car shops.

Tekamah, Neb., will buy a 150-hp. Corliss engine, two boilers and a 100-kw. generator and switchboard for its electric light plant. A. G. Howard is manager.

The Montevideo Valley Power Company, Montevideo, Minn., will install a new and larger plant at Minnesota Falls, to cost $20,000.

Indianapolis

INDIANAPOLIS, IND., Sept. 20, 1915.

Fire on Sept. 14 caused $50,000 damage at the plant of the American High Speed Chain Company, Indianapolis, chiefly to machinery and material.

The Foster Machine Company, Elkhart, Ind., is building an addition to its plant.

The Lake Erie & Western Railway is making plans to erect new shops at Tipton, Ind.

The Continental Auto Parts Company, Franklin, Ind., has been incorporated with $15,000 capital stock to manufacture automobile parts. The directors are Joseph H., S. C. and M. N. Staley.

The Home Electric Company, Wakarusa, Ind., has been absorbed by the Hawks Electric Company, Goshen, Ind.

The Battle Ground Light & Power Company, Battle Ground, Ind., has been incorporated with $10,000 capital stock to furnish light and power. The directors are William J. Walters, Samuel L. Mitchell and G. Frank Doyle.

The Indiana Brass Company, Frankfort, Ind., has increased its capital stock from $20,000 to $25,000.

Milwaukee

MILWAUKEE, WIS., Sept. 20, 1915.

Declinations of opportunities to bid on large war orders and refusal of actual tenders of orders have been more numerous the last ten days than previously, due probably to local agitation with reference to the Anglo-French war loan. Structural people continue to report improvement. Machine tool builders are keeping as busy as ever, although new orders are not so frequent as two months ago. Greater activity is noted in the wood-working industries, which have been quiet for a long time. Milwaukee building figures show a boom and the year's total will be well over $1,000,000 more than a year ago. Bank statements show a $2,000,000 gain in cash resources, with bankers complaining that too much money is lying idle and borrowers restricting their requirements.

The Pawling & Harnischfeger Company, Milwaukee, is operating its shops at capacity. Last week bookings were made of an order for nineteen 5-ton wall cranes from the William Cramp & Sons Ship & Engine Building Company, Philadelphia, and for eleven inside and yard cranes for the Bethlehem Steel Company from five to twenty tons capacity.

The Kissel Motor Car Company, Hartford, Wis., is preparing to double its production. Ground was broken last week for two buildings, one for storage and shipping, 35 x 100 ft., and the other for the enameling department, 35 x 110 ft. A four-story office building will soon be started, which will release considerable floor space for manufacturing purposes.

The Milwaukee Auto Engine & Supply Company, 708 Winnebago Street, Milwaukee, has increased its capital stock from $6,000 to $30,000 to provide for expansion.

Members of the Milwaukee Reliance Boiler Works, Milwaukee, have purchased patents on a metal and glass store fixture and have organized the Panay Horizontal Show Jar Company. The device is now being manufactured at the boiler works, 1102 Thirty-second Street.

The garage and machine shop of W. C. Engel, Sixty-second and Greenfield avenues, West Allis, Wis., is being enlarged by an addition 25 x 90 ft.

The Oslo Light & Power Company, Oslo, Wis., has increased its capital stock from $30,000 to $50,000 to take care of the extension of the hydroelectric plant and transmission system now under way.

The Watertown Table Slide Company, Watertown, Wis., will erect a factory addition, 50 x 100 ft., and a new dry kiln, 40 x 135 ft. F. A. Willenbocker is the architect.

The Home Lumber Construction Company, Baraboo, Wis., is about to build a garage and repair shop of brick and concrete, one story, 68 x 133 ft.

The Protheroe-McGinnis Automobile Company, Baraboo, Wis., is enlarging its garage and will install a complete machine shop.

The Gurney Refrigerator Company, Fond du Lac, Wis., resumed operations Sept. 13 after being closed several weeks for improvements and repairs. All departments are now working full time. E. G. Vail is president.

Approximately $40,000 worth of electric motors, conveyors, chutes, etc., will be purchased by the Chicago & Northwestern Railroad Company for the equipment of its grain elevator now under construction at Milwaukee. Barnett & Record, Flour Exchange, Minneapolis, are the general contractors.

It is reported that the General Electric Company is intending to discontinue the branch works at Madison, Wis., known as the Fort Wayne Electric Works, and consolidate this production at the plant in Fort Wayne, Ind.

The George H. Smith Steel Casting Company, Milwaukee, Wis., is planning to relieve congestion in its present buildings and is preparing to erect a building 65 x 150 ft., to be used as a shipping room.

The Milwaukee Die Casting Company, Milwaukee, Wis., has had plans completed for a two-story building, 50 x 60 ft., brick and mill construction. A. C. Clas is the architect.

Cleveland

CLEVELAND, OHIO, Sept 20, 1915.

An increased demand for 22-in. to 28-in. engine lathes for making 8-in. and 9-in. shells is noted, but other inquiries for machines for making munitions have fallen off, this being attributed largely to the inability to secure early deliveries. Makers of turret lathes state they could still book orders for round lots of machines for 3-in. shell work provided early shipments could be made. Makers of single purpose lathes for shell work have arranged for a large production so that these machines can be furnished for early delivery. The demand for automatic machinery continues heavy and is coming at present almost entirely from makers of automobiles and accessories. Little new foreign inquiry is coming out. Among the sales of the week were six second-hand machines for France. The demand from Akron tire makers for boring mills for mold work is keeping up, orders being placed during the week for six machines. In the foundry trade heavy jobbing shops are very busy and the demand for light gray castings has improved.

The National Carbon Company, Cleveland, will enlarge its plant by the erection of several reinforced concrete buildings, plans for which are being prepared by the Osborn Engineering Company, Cleveland. The general contract has been placed with the Hunkin-Conkey Construction Company.

The Reflex Ignition Company, Cleveland, will establish a machine shop and tool room in connection with its plant and has placed orders for automatic and other machinery.

The C. V. Hill Company, Canton, Ohio, refrigerator manufacturer, has commenced the erection of a new plant, one story, 100 x 370 ft., with a wing, 42 x 115 ft.

The Wright Wrench & Forging Company, Canton, has awarded contract for a steel addition to its plant to the Alliance Structural Company.

The Crofoot Mfg. Company, Findlay, Ohio, has been incorporated with a capital stock of $25,000 by E. H. Crofoot and others to manufacture pressed steel frames for fastening automobiles in box cars during shipment.

The board of trustees of the State Normal School, Kent, Ohio, will receive bids Sept. 25 for a heating plant, including two water-tube boilers, fans, motors, etc. George F. Hammond, 4220 Prospect Avenue, Cleveland, is the architect.

The B. F. Goodrich Company, Akron, Ohio, will further enlarge its plant by the erection of two buildings, contracts for which will be placed shortly. Plans are being prepared by the Osborn Engineering Company.

The Gartland Foundry Company, Toledo, Ohio, will build a foundry at 1809 Delence Street, which it will occupy until its permanent plant is completed.

The Willys-Overland Company, Toledo, is planning the erection of an additional factory building to cost $80,000.

The Cleveland Punch & Shear Works Company, Cleveland, Ohio, on account of the increased demand on its small tool department, has let contracts for extending the buildings to double their present capacity.

Detroit

DETROIT, MICH., Sept. 20, 1915.

The local demand for machine tools continues active. Orders are well scattered and the market is on a firm basis, almost all lines of manufacture contributing to the orders received. The greatest absorption of machinery, however, is by the automobile industry and plant extensions in this one line during the past sixty days will involve a large investment in machine tools. Inquiry for almost all kinds of metal-working equipment is brisk and special machinery is in good demand. The second-hand machinery market reflects general conditions and stocks now on hand are smaller than normal.

J. T. Currie, Detroit, has taken out a permit covering the erection of a factory on Artillery Avenue to cost $10,000. It will be of brick, 60 x 148 ft., one story.

The Detroit Twist Drill Company, Detroit, has awarded the contract for the erection of an addition to its plant to Max Bartholomeai & Co.

The Johnson Heating Company, Detroit, has been incorporated with $10,000 capital stock to manufacture heating and plumbing supplies. William K. Johnson and Thomas G. Barbas are the principal stockholders.

The Herbert Mfg. Company, Detroit, manufacturer of automobile parts, has increased its capital stock from $300,000 to $500,000.

The Detroit Weatherproof Body Company, Detroit, has acquired the plant formerly occupied by the Kemiweld Can Company and has begun manufacturing operations. Haynes Wilson, Lawrence Moore and G. D. Wilson are active in the company.

The Hudson Motor Company, Detroit, has awarded the contract for a three-story brick and steel addition to its plant.

Arrangements are being made by the Columbia Truck & Trailer Company, Kalamazoo, Mich., manufacturer of auto trailers, for a factory to take care of the rapid growth in its business.

The American Steel Adjustable Screen Door Company, Battle Creek, Mich., has been organized to engage in the manufacture of steel screen doors and has acquired the plant formerly occupied by the National Cereal Company. The incorporators are N. E. Hubbard, Arthur Walker and Robert Bock.

The, American Banking Machine Company, Saginaw Mich., has been incorporated with a capital stock of $110,000 to manufacture vending machines. The incorporators are R. T. Hosking, W. H. Howland and J. B. Pitcher.

The Superior Mfg. Company, Ann Arbor, Mich., manufacturer of lamps and lighting systems, has acquired an additional factory which will enable it to double its present output.

The Cheboygan Electric Light & Power Company, Cheboygan, Mich., will install an auxiliary power plant, which will be equipped with two boilers and an engine and dynamo of 250 hp. capacity.

The Keeler Brass Company, Grand Rapids, Mich., manufacturer of automobile hardware, metal specialties, etc., will immediately commence the construction of an addition to its plant, 150 x 200 ft., to be used for cutting operations with punch presses and automatic screw machines.

Cincinnati

CINCINNATI, OHIO, Sept. 20, 1915.

Numerous requests are being received by local manufacturers to bid on lists of shrapnel and other shells. Letters and telegrams from self-styled "special agents" have been the cause of the circulation of a number of erroneous reports. The latest of these is that a Cincinnati firm has taken a large contract for rifles, a denial of which rumor is only made for the benefit of non-residents who do not realize its absurdity. The foreign demand for machine tools appears to have abated somewhat although enough business is on the books of many companies to keep them operating well into next year. A very good demand has come lately from Europe for shaping machines, but the call for these machines from domestic sources is light. More encouraging reports are received from the South, and lumber companies are figuring on both power and wood-working equipment. The boiler and tank business is much improved, although not yet up to normal. A number of local foundrymen will leave this week for Atlantic City to attend the Foundrymen's convention, but only a small number of machine-tool manufacturers will have exhibits at this year's meeting, which is attributable to the present demand for machines from Europe. Medium-sized generators and motors are in very good demand.

The Huenefeld Company, Cincinnati, manufacturer of stoves, ranges and sheet-metal specialties, is having plans prepared for an addition to its plant on Spring Grove Avenue, approximately 75 x 225 ft., six stories, of mill construction. No equipment lists have yet been made up.

The H. J. Reedy Elevator Company, Cincinnati, has purchased the plant of the National Lathe Company, Batavia, Ohio, and has moved the equipment to 15 West Second Street, Cincinnati. The company's output of 13-in. and 17-in. lathes will be doubled. A. V. Carroll is president and general manager.

The Hess Spring & Axle Company, Carthage-Cincinnati, will make an addition to its plant. The power plant equipment has already been purchased.

The George Automatic Roller Bearing Company, Winton Place, Cincinnati, recently removed from Hamilton, Ohio, has its plant in full operation. A building, 75 x 90 ft., for a heat-treating outfit, will be added.

The Cincinnati branch of the White Motor Car Company will build a garage and repair shop at Peebles Corner. Howard Fenker is manager.

The Otto Armieder Company, Cincinnati, manufacturer of auto trucks, has awarded contract for a garage and repair shop to be erected on York Street.

The Richardson Paper Company, Lockland, Cincinnati, is building an addition to its power plant. Most of the necessary equipment has been purchased.

The Ault & Wiborg Company, Cincinnati, varnish and ink manufacturer, has let contract for an addition to its plant in Norwood, Ohio.

The additions to the plant of the Cisco Machine Tool Company, Cincinnati, are nearly completed and will be occupied at an early date. The company reports the receipt of orders from Europe for 1700 lathes in the past few weeks. These are now being made in ten different plants in this country and Canada. G. Mil Horton is general manager.

The contract for the addition to the plant of the Acme Machine Tool Company, Cincinnati, has been awarded to D. Meinken. It will be completed before winter.

It is reported that the C. W. Raymond Company, Dayton, Ohio, brick machinery manufacturer, is in the market for about fifty lathes to finish a special export contract.

S. J. Patterson, Dayton, Ohio, has let contract for a manufacturing building to be erected on Hartford Street.

The New Philadelphia Paving Block Company, New Philadelphia, Ohio, has been incorporated with $150,000 capital stock by C. R. Marlow and others. No manufacturing details are now available.

The Sebring Tire & Rubber Company, Sebring, Ohio, has been incorporated with $200,000 capital stock by John Hotchkiss, William F. Smith, and others.

It is reported that Benjamin Tate, Ashland, Ky., is interested in a new company to erect a refrigerating plant at Huntington, W. Va.

The H. Clauss Mfg. Company, maker of cutlery, Fremont, Ohio, is in the market for various machinery and power equipment, including drilling machines, tapping machines, lathes, punch presses, machine vises, bench tools, roller bearing hangers, electric motors, heating systems, steel sash, etc.

The Central South

LOUISVILLE, KY., Sept. 20, 1915.

The improved demand for electrical equipment is one of the most encouraging features of the trade. This line of machinery has been quiet for several weeks, but manufacturers and dealers report a good call has developed for motors and generating units. A steady demand for direct-connected motor-driven machine tools and other special machines is also noted. Manufacturers of drop forgings report a good trade, the automobile makers especially being in the market. Wood-working machinery is active, and ice machinery manufacturers are also getting many inquiries. Sales of oil engines of the improved type for small plants continue heavy.

The Commonwealth Mfg. Company, Louisville, has been incorporated with $200,000 capital stock to manufacture chemical and electrical specialties. It will establish a factory, but details have not yet been worked out. Clarence F. and Alfred W. Ott are stockholders.

Grainger & Co., structural iron manufacturers, Louisville, are in the market for a three-phase alternating current motor of 50-hp. capacity. Second-hand equipment will be considered.

The Voss Table Company, Sixteenth and Abegust streets, Louisville, has plans for a brick addition to its factory, one story, containing 900 sq. ft. of floor space. Special equipment for finishing, such as power-driven sprayers and rubbers, will be needed. J. E. Riddell can be addressed.

The Continental Car Equipment Company, manufacturer of contractors' equipment, Highland Park, Ky., has been reorganized as the Continental Equipment Company, and plans to operate its plant.

The Louisville Water Company, Louisville, plans to construct a new pumping station with a daily capacity of 30,000,000 gal., to cost $750,000. James Wilson is chief engineer.

The Sure Grip Fire Hydrant Wrench Company, Paducah, Ky., has been incorporated with $1,000 capital stock by A. L. Hays, A. M. McKinney, and others.

Walker Bryant and E. M. Burton, Columbia, Ky., have begun the erection of a planing-mill, and will be in the market for power and wood-working machinery.

The Glasgow Motor Car Company, Glasgow, Ky., has been organized and will erect a garage and automobile repair shop.

New stokers for the power plant of the municipal electric light system will be purchased by Nashville, Tenn.

The Sylvan Cotton Mills, Shelbyville, Tenn., is in the market for a considerable amount of transmission machinery.

The American Auto Jack Company, Memphis, Tenn., has been organized with $10,000 capital stock by J. E. Richards, Harry W. Watson and P. H. Pierce.

The Robinson Balance Slide Valve Company, Knoxville, Tenn., will have its specialty manufactured by contract for the present. A plant will be established later. Bird I. Robinson is president and Frank P. Robinson secretary and treasurer.

F. P. Hudgins, 16 East Marshall Street, Richmond, Va., is in the market for the following machines: One lathe with 36-in. swing; one lathe with 20-in. swing, and quick-change gears; one lathe with 14-in. swing, suitable for threading worms from ¾ in. to 1¾ in. pitch; toolroom lathe, a planing machine, a shaping machine, three drill presses, a turret lathe, a pulley lathe, a power hack-saw, a 12-in. emery stand and two emery wheels; a bolt-threading machine, a worm milling machine, chain hoists, etc. He is also asking for prices on wood-working machines, including a jointer, a miter knife, a combination rip and cut-off saw, a bandsaw, planing machine, a wood lathe and other wood-working supplies and second-hand motors.

The Talladega Foundry & Machine Company, Talladega, Ala., is planning to double its foundry capacity and will also add a full line of machinery and mill supplies.

St. Louis

ST. LOUIS, MO., Sept. 20, 1915.

The machine-tool business continues to increase, so far as deliveries will permit. No large lists are appearing. General business continues to improve and funds are easy at the banks with, perhaps, a slight tendency toward tightening, due to possibilities of the foreign loan situation coupled with the crop moving demand. Rates are no higher, however. Collections are reported good.

The Green Car Wheel Company, St. Louis, Mo., is to build a foundry which will cost approximately $6,000.

The Railway Life Saving Appliance Company, St. Louis, Mo., has been incorporated with a capital stock of $500,000 by J. C. Crouch, C. H. Cook, E. Pierce, and others, to manufacture a patented device.

The Columbia Quarry Company, St. Louis, Mo., has increased its capital stock from $80,000 to $100,000.

The Jiffy Water Heater Company, St. Louis, Mo., has increased its capital stock from $25,000 to $125,000.

J. C. Waugh, Blue Springs, Mo., will rebuild and re-equip his burned electric light station and ice plant.

The Ozark Power & Water Company, Branson, Mo., will extend its plant and distributing equipment to serve nearby towns.

The Big Six Petroleum Company, Kansas City, Mo., has been incorporated with a capital stock of $500,000 by J. C. Wolf, Kansas City; Porter O. Minor, Emsworth, Pa., and John R. Brown, Pittsburgh, Pa., and will shortly be in the market for equipment.

The Steelville Electric Light & Power Company, Steelville, Mo., has been incorporated with a capital stock of $10,000 by John Zaborsky, Jr., A. H. Harrison and W. E. Evans.

The Firestone Tire Company, Akron, Ohio, will equip a tire plant at Kansas City, Mo., to cost $200,000.

Smith Brothers, Independence, Mo., will equip a machine shop and garage to cost $10,000.

The St. Joseph Water Company, St. Joseph, Mo., will enlarge its waterworks plant. Plans are not yet complete.

Washington, Mo., will buy the local waterworks and expend $20,000 on improvements. P. F. Peitz is mayor.

The Campbell Electric Light & Power Company, Campbell, Mo., has been incorporated with a capital stock of $30,000 by Ben F. Eicholz, R. C. Jones and W. E. Glenn.

The Commissioners of Waterworks and Sewerage, District No. 1, Benton, Ark., will receive bids to Sept. 28 for two 100-hp. boilers, one 200-hp. heater, a feed pump, two steam pumps of 500-gal. per min. capacity, three centrifugal pumps of 300 gal. per min. capacity, one 90-hp. engine, one 60-kw. generator, etc.

Bott Brothers, Marianna, Ark., will equip a stave mill and are in the market for machinery.

An oil distribution and pumping plant will be equipped at Pine Bluff, Ark., by the Texas Company, Houston, Tex.

J. G. Clark & Son, Daleville, Ark., will equip a hardwood lumber mill with a daily capacity of 50,000 ft.

The Little Rock Railway & Electric Company, Little Rock, Ark., has acquired the Central Heating & Mfg. Company and will enlarge the plant.

The Pekin Cooperage Company's plant, Guidon, Ark., which has been burned with a loss on equipment of $20,000, will be replaced.

The Altus Ice Company, Altus, Okla., will enlarge its ice-making plant and also equip a cold storage warehouse.

The Southern Fish & Oyster Company, Muskogee, Okla., will install a refrigerating plant of 10 tons daily capacity.

The Choctaw Lumber Company, Broken Bow, Okla., will build a hardwood mill of 75,000 ft. daily capacity, to cost about $100,000.

The Asher Bridge Company, Asher, Okla., has been incorporated with a capital stock of $15,000 by W. M. White, D. F. Christ and E. I. Majors and will buy equipment for steel bridge fabrication.

The R. R. C. Bottle Company, Shreveport, La., will equip a bottle-making plant at Ardmore, Okla.

The Tank Lightning Arrester Company, Tulsa, Okla., has been incorporated with a capital stock of $25,000 by G. W. Van Horn, John C. Skillman and Clinton L. Goodale to manufacture a patented device.

James Curtner, Okmulgee, Okla., will build a garage and machine shop to cost $35,000.

Paul's Valley, Okla., will expend $16,000 enlarging its pumping plant. L. W. Wettermark is city clerk.

The Crystal White Refining Company, Allen, Okla., will equip a pipe line and pumping station of 100 bbl. per hour capacity.

The Southwestern Light, Power & Railway Company, W. T. Croslen, president, Security Building, Oklahoma City, Okla., is completing plans for a gas engine driven hydro-electric plant of 11,000 hp. capacity. Ultimate plans for 75,000 hp. at three points are under consideration.

The Beaumont Veneering Company's plant at Beaumont, Miss., burned with a loss of $24,000, will be replaced.

The Groomes-Foretich Company, Hattiesburg, Miss., will increase its capital by $25,000 and add boiler power, retorts, etc., to its plant for turpentine, pine oil and resin manufacture.

James A. Fuson & Bros., Columbus, Miss., are reported in the market for machinery to cut sheet-iron patterns; also for dies and corrugating machinery.

The New Orleans Pickery Company, New Orleans, La., A. D. Brady, secretary, will install electric presses, etc., for handling damaged and irregular cottons.

The Central Light & Power Company, Amite, La., H. E. Burnham, manager, will install a 10-ton ice plant.

The W. W. Carre Lumber Company, New Orleans, La., will re-equip its burned mill at a cost of $8,000.

The Mohawk Motor Corporation, New Orleans, La., has been incorporated with a capital stock of $100,000 by J. Bart Davis, Hibernia Bank Building, and others, to manufacture automobiles. It plans a plant to cost about $200,000.

The City of Oakdale, La., R. E. L. Ricketts, secretary, is in the market for two underwriters pumps, of 750 gal. per min. capacity, one 80-hp. fuel oil engine, and other water-works equipment.

One 100-kw. generating unit will be added to the electric plant of Nachitoches, La. Walter E. Aymond is superintendent.

The Lyon Cypress Lumber Company, Garyville, La., will equip a hardwood mill of 50,000 ft. daily capacity, a planing mill and a powerhouse.

The Salmen Brick & Lumber Company, Slidell, La., will equip a double band sawmill with a daily capacity of 100,000 ft.

Texas

AUSTIN, TEX., Sept. 18, 1915.

The machinery and tool trade shows little change from last week. An increase in the demand for mill machinery is noted. The recent advance in the price of cotton has augmented the optimistic feeling in business and industrial circles.

Armour & Co., Chicago, Ill., will rebuild their cold storage plant at Galveston, which was destroyed by the recent storm. The new plant will cost about $60,000.

The city council, Orange, will have plans prepared for municipal wharves, docks and other improvements for which $325,000 of bonds have been issued.

The Farmers' Gin Company, Howe, will build a cotton gin at a cost of about $15,000.

The Electric Light & Power Company, Luling, plans to install an electric street lighting system.

The Ruud-Humphrey Water Heater Company, Dallas, has been organized with a capital stock of $10,000. J. W. Barber is a stockholder.

The Post City Gin Company, Post, will build a cotton gin to cost about $10,000. W. C. Stevens is a stockholder.

The Courthouse Garage & Supply Company, Waco, which was recently organized with a capital stock of $5,000, will build a garage and repair shop. J. J. Richards is in charge.

A drainage and levee system will be built near Ennis with the proceeds of $125,000 of bonds issued for the purpose.

The Monodale Gin Company will build a cotton gin at Taylor to cost about $10,000. T. E. Burns is in charge.

The Garner Road Machinery Company, Houston, has been organized with a capital stock of $10,000. Herbert Godwin is a prominent stockholder.

The Central Texas Ice, Light, Power & Water Company, Mexia, which recently increased its capital stock from $60,000 to $100,000, will enlarge its plant.

San Francisco

SAN FRANCISCO, Sept. 14, 1915.

Many industries show a noticeable increase of activity. Manufacturers quite generally look for a marked revival during the next year and more plans for larger factory capacity are taking shape than for some time past. Machine tool stocks are greatly depleted, and buyers are reluctant to place orders for future delivery. One manufacturer in this territory has turned down a large munitions order in expectation of better profits in its regular line. Wood-working machinery is in better demand. More interest is noted in engines, motors, etc. Pumping equipment is moving well, with an amount of oil-refinery business and a few large irrigation jobs.

The Boden's Automatic Hammer Company, 156 Second Street, San Francisco, manufacturer of an automatic nail-driving device, is figuring on building a larger factory at Palo Alto, Cal.

The Union Iron Works has placed an order with Fred Ward & Son for a 28-in. Gould & Eberhard shaping machine, 32-in. stroke.

The Contra Costa Gas Company, Martinez, Cal., is preparing to install an auxiliary pumping system at a cost of $40,000.

The Allison & Berry Company has taken over the shop of the Axelson Machine Company, Coalinga, Cal.

E. E. Arellanes, Santa Barbara, Cal., is building a machine shop in connection with his blacksmith shop.

The Porterville Magnesite Company, Porterville, Cal., has purchased a site for a reduction plant and will furnish magnesite for several local steel plants.

Announcement has been made that one of the largest fabricating steel plants in the West is to be built at once at Oakland, Cal., and will be known as the California Steel Works. E. H. E. Frisell is at the head of the new company.

The Merchant Calculating Machine Company, Emeryville, Cal., is to start work at once for six units of a new plant, the total cost of which will be over $300,000.

The Pacific Northwest

SEATTLE, WASH., Sept. 14, 1915.

Activity in the lumber trade has undergone a small improvement. Railroads are buying constantly for repairs and improvements, and a fair demand has been noted recently from furniture makers. The box trade in the Northwest, due to the fish, fruit and vegetable canneries operating on orders for war supplies, has taken a great quantity of lumber. Little change is noted in the discouraging export situation. Cargo facilities have eased only slightly, but not enough to furnish any real relief to shippers. Frank Waterhouse, Inc., has recently leased several Japanese steamers, which will be put on the Vladivostok run for October deliveries. Irrigation machinery demand is brisk, and several large projects have been launched recently. Machinery men report good sales the past week, with some excellent prospects on file. Alaska mining work is demanding large shipments of machinery.

The plant of the Phoenix Shingle Mill Company, Seattle, was practically destroyed by fire recently, with a loss of more than $25,000. It was the second largest in the Northwest. The mill will be rebuilt at once. Eight machines, and a recently installed boiler plant were destroyed.

Phoenix Iron Works, Portland, Ore., whose plant was recently damaged by fire, has awarded contract for repairs to Franchell & Parelius.

The Antimony Smelting & Refining Company, Renton, Wash., has applied for a permit to alter the structures and add new buildings to the sewer-pipe plant of the Denny-Renton Clay & Coal Company at Van Asselt, which will be adapted to the reduction of antimony ore.

The Portland Cement Company, owning a big cement plant at Oswego, Ore., has been reorganized by Nevada capitalists, and the company granted permission to resume

operations in Oregon. The plant at Oswego is to be entirely reconstructed and put in operation. The company is now organized for $2,000,000, and new working capital amounting to $500,000 has been secured. P. B. Ellis, Carson City, is president, and Aman Moore, Oswego, secretary and treasurer.

The Eccles Lumber Company's plant, at Baker, Ore., destroyed recently, with a loss of more than $100,000, is to be rebuilt at once. Electric motors will be installed to operate each of the planing machines. This installation will be utilized until steam power can again be installed.

The sawmill of the Callahan Brothers, Gaston, Ore., was swept by fire recently, with a loss of all the buildings and machinery.

Albion, Idaho, recently voted a bond issue of $8,000 to increase the supply of electrical energy for light and power purposes.

Terry, Mont., has granted to L. H. Gaffney, Terry, franchise to construct an electric lighting plant.

The Lawrence Denny Company, Spokane, Wash., owner of patents covering underwater current motor, has been organized with a capital stock of $35,000, and will establish a plant in Spokane. R. T. Lawrence and H. A. Denny, both of Spokane, are the incorporators.

The J. I. Case Threshing Machine Company, Racine, Wis., will erect a two-story addition to its plant at Billings, Mont., to cost $100,000. O. J. Thomas is local manager.

A northwest agency will be established in Seattle by the Magor Car Company, New York City, for its all-steel logging and dump cars.

The Henry Mfg. Company, manufacturer of water meters, has appointed A. A. Miller, 303 Henry Building, Portland, Northwest representative for the company.

The Occidental Sheet Metal Works, 1008 First Avenue, South, Seattle, Wash., recently moved its shops to 544 Railroad Avenue, South. A. Snellenger is president.

Canada

TORONTO, Sept. 18, 1915.

The British War Office is prepared to order between 2000 and 3000 heavy guns of different caliber in Canada, to be delivered within two years if the Canadian manufacturers can handle the orders. At a conference recently held in Ottawa a proposition was made that parts of the guns be manufactured at various plants and the assembling done at some central point. Canadian shops are not at present equipped with facilities for turning out gun parts but representatives were present from most of the companies in Canada which have received orders for the manufacture of shells, and a large number of them were in favor of the proposition. If this plan is adopted it will be necessary for Canadian manufacturing plants to install a large amount of new machinery.

The Medicine Hat Pump & Brass Mfg. Company, Medicine Hat, Alberta, is in the market for three new lathes, 14 to 18 in., for immediate delivery.

The Concrete Post Company, Brantford, Ont., has secured a site at Winnipeg, Man., and will erect a factory.

The Universal Measuring Devices, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by Stanley A. Waggett, 125 Isabella Street; George N. Limpricht, 28 Herbert Avenue; Gerard Ruel, and others, to manufacture measuring devices, etc.

The Alberta Flour Mills, Ltd., Calgary, Alberta, has been incorporated with a capital stock of $5,000,000 by Arthur T. Seyler; Homer H. Farman, Thomas M. Ovens, and others, to operate mills.

The Kippewa Lumber Company, Ltd., Ottawa, has been incorporated with a capital stock of $50,000 by Charles E. Read, Frederick W. Avery, James F. Smellie, and others.

Cooks, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Frank J. Foley, 156 Yonge Street; Daniel J. Coffey, 12 Nanton Avenue; John H. Flett, to manufacture explosives, ammunition, firearms, guns, etc.

The Economy Tube & Puncture Proof Tire Company and the Stockwell Motor Company, St. Catharine Street, Montreal, Que., were destroyed by fire with a loss of $60,000.

The Crow Motor Company, Mount Brydges, Ont., plans a factory to manufacture automobile motors, to cost $10,000.

An addition is being built to the Wallaceburg Cut Glass Works, Wallaceburg, Ont. A. Gregory, Dresden, Ont., is the contractor.

The pumping plant of J. & J. Kerr Company, Tank Street, Petrolia, Ont., was destroyed by fire with a loss of about $5,000.

The Fournier Company, Ltd., Lachine, Que., is in the market for prices and information on hoisting machinery, etc.

Dover, Ont., will build a new pumping plant. James St. Pierre, Bear Line, Ont., is the commissioner.

George Gordon & Co., Ltd., Cache Bay, Ont., will rebuild its sawmill, recently destroyed by fire, at a cost of $75,000. Alexander Trottier is in charge.

Leek & Co., Ltd., Vancouver, B. C., has been incorporated with a capital stock of $100,000 to manufacture electrical goods, machinery, iron, steel, etc.

The Mainland Cedar Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $100,000 to manufacture lumber, etc.

The Schaake Company, Ltd., New Westminster, B. C., has been incorporated with a capital stock of $20,000 to manufacture sawmill machinery, agricultural implements, tools, boilers, brass, etc.

Large extensions will be made to the plant of Peter Lyall & Sons Construction Company, Ltd., Montreal, for the manufacture of shells. A large amount of machinery is also being installed in its forging plant.

Government Purchases

WASHINGTON, D. C., Sept. 20, 1915.

The commissioners of the District of Columbia, Room 509, District Building, Washington, D. C., will receive bids until 2 p. m. Oct. 11 for furnishing, delivering and erecting one steam turbine driven centrifugal pump of 5,000,000 gal. per 24 hr. capacity. Specifications may be obtained from the commission, addressing them at the District Building, room 320.

The general purchasing officer for the Panama Canal, Washington, will receive sealed proposals until 10.30 a. m., Oct. 6, under proposal 970, for an engine lathe, a forcing press, bench filing machines, valve-reseating outfits, bolt heading and forging machines, plate bending and straightening rolls, a double angle shear, a plate planing machine, a flanging clamp, a pipe machine, a hand lever punch, a metal cutting saw, and a drill press; until 10.30 a. m., Oct. 8, under proposal 971, for transformers, electric motors, etc.

NEW TRADE PUBLICATIONS

Flexible Couplings.—Clark Flexible Coupling Company, Inc., 27 Walker Street, New York City. Bulletin No. 4-16. Calls attention to a coupling for shafting that is claimed to be flexible in all directions. The special feature of the coupling is one or two rows of chain which pass over sprockets and hold the shafts in place. These sprockets are cut on the flanges of the coupling and are pressed tightly against the shaft. Illustrations of the various types of couplings are presented together with diagrams showing the construction and the dimensions. A table of the several sizes that can be supplied for each type of coupling is included.

Elevators.—Warsaw Elevator Company, Warsaw, N. Y. Catalog. Calls attention to a line of electric and hand power freight and passenger elevators and a dumbwaiter of the push button type. The catalog is composed of a series of four-page bulletins each relating to some particular elevator or elevator machine. In the bulletins a brief description of the machine or elevator covered is given on the left-hand inside page with one or more views on the facing one.

Injectors.—Penberthy Injector Company, Detroit, Mich. Catalog No. 27. Refers to a line of automatic injectors and ejectors, regrinding brass valves, oil and grease cups, water gages, etc. The catalog is divided into five sections, each of which is devoted to one particular line and the various types that can be supplied are illustrated with brief descriptions and condensed specification tables. Some of the factors to be considered in selecting an injector are discussed and instructions regarding the installation and repair of the automatic injectors are included.

Protective Paints.—Goheen Mfg. Company, Canton, Ohio. Pamphlet entitled "Engineers' Handbook on Protective Coatings." Devoted to a line of protective paints for all classes of metal work and presents the various products in a general way. The paints covered include a carbonizing coating for iron and steel, a red lead paint for structural work and paints for galvanized and ornamental iron, steel cars, concrete work, interior walls and for waterproofing concrete and fireproofing wooden structures. Concise descriptions of the various paints are presented and in some cases brief specifications and cost data are included. An index of the various materials for which these paints can be used and also of the paints themselves is included.